From:	Marc Ferries
Sent:	Friday, March 17, 2023 2:58 PM
To:	Dollhopf, Ralph; Kelly, Jack (R3 Phila.); DiDonato, Ann
Cc:	Garypie, Catherine; Cahn, Jeffrey; Dixit, Naeha; Clark, Jacqueline (she/her/hers); Eiseman, Robin; david.schoendorfer@nscorp.com; Veira, E. Fitzgerald; Matthew.Gernand; Peggy.Otum@wilmerhale.com; hollister.hill@nscorp.com; geoffrey.rathgeber@nscorp.com; robert.wood2_nscorp.com; Aufdenkampe, Steven R.; R5_OPS; R5_PSC; R5_ENVL; R5_SITL; R5_DATA; R5_DOCL
Subject:	East Palestine Train Derailment Site - Directive #3 Data Management Plan
Attachments:	E Palestine Data Mgmt Plan Elements rev a final 3-17-23.pdf

Follow Up Flag:	Follow up
Flag Status:	Flagged

Ralph, Jack, and Ann:

The United States Environmental Protection Agency's Site Directive #3 dated March 12, 2023 (the "Directive") requires Norfolk Southern Railway Company ("Norfolk Southern") to submit a Data Management Plan (DMP) within five calendar days of the Directive, which is March 17, 2023. In accordance with the Directive, please find the DMP attached. The DMP addresses the following:

- Data Manager Roles and Responsibilities – Identifies the key functions required for ensuring accuracy of data.
- Data Streams and referring to written procedures for ensuring information accuracy.
- Norfolk Southern is developing a centralized quality data management system to facilitate and transfer of electronic environmental data to EPA. Implementation of this system will be documented in the forth coming East Palestine Train Derailment Site Data Management Plan.

Regards, Marc

Marc Ferries, P.E.| *Project Coordinator, East Palestine – Train Derailment Site*
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INTERIM DATA MANAGEMENT PLAN

East Palestine Train Derailment Site
Norfolk Southern Rail Line, East Palestine, Columbiana County, Ohio
Site/Spill Identifier (SSID): C5XR
Unilateral Administrative Order
Site Directive #2: Data Management/Communication By NSR

Prepared for:

Norfolk Southern Railway Company

Submitted to:

Mr. Ralph Dollhopf
Mr. Jack Kelly
US Environmental Protection Agency Region 5 and Region 3
On-Scene Coordinators

Prepared by:

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Attachment 2 – CTEH Data Management Plan Data Stream Summary
Attachment 3 – Stantec Data Management Plan Data Stream Summary

1.0   INTRODUCTION & PURPOSE

Norfolk Southern Railway Company (NSR) has assembled this Interim Data Management Plan (DMP) for the East Palestine Train Derailment Site (the Site), East Palestine, Ohio in response to the directive issued on March 12, 2023, as Respondent, pursuant to the Unilateral Administrative Order for Removal Actions (UAO) CERCLA Docket No. V-W-23-C004 for the Site issued on February 21, 2023. This Plan is intended satisfy requirements within the UAO regarding data management by NSR and as further detailed in US Environmental Protection Agency Site Directive #2, Data Management / Communication by NSR, dated March 12, 2023 (the Directive). This Interim DMP describes data management practices implemented during the emergency response to the derailment incident.

The Data Inventory listing all field data collected by NSR and its contractors was delivered as required via email on March 13, 2023, and outlines the data elements to be covered in the DMP. This Interim DMP outlines more specifically how the various data elements are handled by each contractor engaged to perform investigation and sampling work supporting the emergency response phase of the incident. These contractors, Arcadis, CTEH and Stantec, provided their respective methods, procedures, roles and end-products that are either planned or completed as part of incident response. Plans developed by each respective sampling contractor are contained in Attachments 1, 2 and 3.

This Interim DMP is intended to document project-related data management activities. The project generates significant quantities of analytical and field data, which require both storage and accessibility for the Project team. Data management systems will be implemented to effectively process the information without loss or alteration. The approach outlined in this Interim DMP is designed to provide an organized method of data management for the data that will be generated during the Program building on the Data Inventory.

The objectives of this DMP are to identify:

- Data types that are collected (soil, water, sediment, air)

- Data collection method standard operating procedures (SOPs), established or expected (capture, storage, transfer)
- Data verification procedure SOPs, established or expected (steps to ensure accuracy)
- Other data management procedures (handling, formats, transfer, storage, etc.)
- Roles and responsibilities
- End products and time data will be available to end users (point, shape, database, image)

The objectives are intended to satisfy the requirements under the Directive to:

- Define the Data Manager Roles and Responsibilities.
- Identify the key functions to ensure data accuracy.
- Describe the Data Streams and written procedures and SOPs required for ensuring data accuracy.

Different data streams are generated by sampling contractors engaged for the response. Under this Interim DMP, each individual sampling contractor has responsibility to ensure adherence to SOPs for the respective media sampled. SOPs for data collection and sampling are provided in the various work plan deliverables either submitted or under review as per the UAO. Written SOPs are referenced in the summary tables provided by the sampling contractors for the described data element where applicable.

As the project moves from the emergency response phase, to work under the UAO, it is the intent to compile and consolidate project data from different source systems and media that can be used to evaluate site conditions, establish data trends and to monitor performance. An overarching component of the Interim DMP is to provide accurate data as quickly as practical in formats compatible for display and for delivery as required under the UAO. The Interim DMP will be modified as the centralized data management system is developed and maintained.

Project Navigator, Ltd.

2.0   TEAM ORGANIZATION AND RESPONSIBILITIES

Norfolk Southern Railroad Company is the party with overall responsibility for compliance under the UAO. The following are the team members and their responsibilities for the data management process:

NSR Project Coordinator: The NSR Project Coordinator, Marc Ferries P.E. of Project Navigator, Ltd., (PNL)., (Section X of the UAO) will monitor and oversee the data management work. Mark Landress P.G., will assist Marc Ferries with the day-to-day data coordination. The data management responsibilities of the Project Coordinator include ensuring compliance under the UAO and providing the USEPA and other agencies with the required notifications, updates and other status relating to the data management task.

Sampling Contractors: Under the Interim DMP, the NSR contractors engaged to collect, manage and distribute data on behalf of NS have the ultimate responsibility to ensure all required project data has been collected, organized, stored, checked and distributed. The individuals charged with the task of managing data for the respective media under the Interim DMP are tabulated in the tables provided in the attachments.

3.0   TYPES OF DATA TO BE COLLECTED

During the course of the incident response work, data will be collected for many purposes. These include gathering data related to the derailment response, to be used for future remedial design activities, collecting quality control data so that immediate field changes can be made, and collecting data to be used to document that completed work has been done so in accordance with the project specifications described in the approved work plans. Data will also be collected to verify that performance specifications have been achieved. The types of data to be collected will include but may not be limited to:

- Analytical data for soil, sediment, surface water, groundwater and air
- Daily site meteorological data
- Survey and spatial information including coordinates, elevations, site features, excavations, stockpiles, etc.
- Ground and aerial photographs
- Field instrument calibration logs
- Quality control and quality assurance data including inspection records, reports, and testing data

4.0   DATA MANAGEMENT SYSTEM

Activities performed at the Site will involve accessing a number of different types of data collected or retained for various uses. Since there are such a variety of different types of data that will be generated, tracked, sorted, and stored throughout the course of the project, there will be several different types of software required to view and manipulate the data. Under the Interim DMP, Sampling Contractors have utilized their preferred data management system and provided exports to data users where applicable. NSR intends to consolidate environmental data into a centralized Earthsoft EQuIS® database, which will serve as the primary format that will be used for managing environmental data and associated metadata.

Data outputs are determined by data users and regulatory stakeholders. Formats required for other applications to facilitate ease of viewing and data transfer will be generated as needed prior to being transmitted. This may include for example, spreadsheet data tables. EDDs are prepared in the format requested by the agencies and follow the EPA electronic data deliverable specifications. As NRSC moves to a centralized EQuIS database and data management process for environmental data, data transfer protocols will be developed to support the following activities (without limitation):

- Exports to NSR and designated agencies and contractors
- Creation of EDD exports in USEPA specific formats for various regional delivery
- Exports for other state and federal stakeholders as requested
- GIS formats such as ArcView and ArcView Online and other near real time results
- Realtime air monitoring

4.1   DATA TRACKING AND QUALITY CONTROL

Field collected data is tracked as per the field SOPs which may include electronic, written logbooks, spreadsheets, photographs, data recorders or other forms. Data tracking is managed as per the SOPs as described in the supplied table.

The Quality Assurance/Quality Control is established by each contractor as per the respective SOPs and QA/QC programs which are established for the project. Complete descriptions of QA/QC activities for each investigation are described in the associated Quality Assurance Project Plans (QAPPs).

4.2 GENERAL FORMAT DOCUMENTS

All other documents that are generated in other formats like word processing documents and electronically converted (scanned) documents will be converted to Adobe Acrobat (pdf) format for ease of use. Photographs will be stored as JPEG images and any video will be stored in MP4 or other compatible format or as otherwise described in the attached workflow tables. Other documents and information collected that is not otherwise specified, will be managed as a general work product, indexed and archived in the NSR data storage system or parsed to contractors for incorporation into the overall data management system.

4.3 BACKUP DATA MANAGEMENT

Maintaining backup data is an important component of the management of project data. Adequate backup files allow for recovery of important data in the event of accidental or intentional corruption, loss, or destruction of the original data. For data critical to the ongoing operations, offsite storage facilitate keeping the project operational in the event of a physical disaster at the Site. Offsite storage is typically maintained by each contractor and would be checked by the Project Coordinator Final records will be retained by NSR for a period of ten years following the completion of the project and then turned over to NSR and USEPA as described in the UAO.

5. COMPREHENSIVE DATA MANAGEMENT SYSTEM DEVELOPMENT

The attached data tables and plans describe data management processes employed for data collected since the derailment incident. NSR is in the process of developing a centralized Environmental Quality Data Management System (EQDMS) to facilitate transfer of electronic environmental data to the EPA Region 5 Earthsoft EQuIS® database. Implementation of the EQDMS will impact the data flows described herein; the data processes under the centralized EQDMS will be documented in the forthcoming East Palestine Train Derailment Site Data Management Plan (EPTD DMP).

Submitted by:

Marc Ferries, P.E. Project Navigator, Ltd. Respondents' Project Coordinator.
On behalf of Norfolk Southern Railway Company

_____/ MFerries_____ Date: ____3-17-2023_____

Mark Landress, P. G. Project Navigator, Ltd. Data Coordinator for Marc Ferries

_____/ MLandress _____Date: ____3-17-2023_____

ATTACHMENT 1

ARCADIS

East Palestine Train Derailment Site

Data Management Plan

Data Stream Summary

![ARCADIS]

Norfolk Southern Railway Company

Data Management Plan

East Palestine Train Derailment Site
East Palestine, Ohio

March 16, 2023

Data Management Plan

East Palestine Train Derailment Site

East Palestine, Ohio

March 16, 2023

Prepared By:
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Prepared For:
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Appendix B – Field Forms

Data Management Plan
East Palestine Train Derailment Site

1   Introduction

Data management provides for the accuracy and ready accessibility of all necessary data to meet the project analytical, spatial, and reporting objectives. The data management program established for the project includes field documentation and sample quality assurance/quality control (QA/QC) procedures, methods for tracking and managing the data, and a system for filing all site-related information. More specifically, data management procedures will be employed to efficiently process the information collected such that the data are readily accessible and accurate.

Records that may require controls during the data management process include:

- Field data captured either through the use of the FieldNow® application or traditional forms (Logbooks or relevant field forms;
- Analytical data importation into EQuIS or an alternative platform;
- Geospatial location;
- Calculations (including those from data reduction and analysis);
- Calibration data;
- Data usability results;
- Inspection results;
- Field Instrument test data;
- Sampling IDs;
- Materials testing field data or lab results;
- Personnel qualifications;
- Sampling and analytical QC data (including objective and statutory evidence);
- Technical and readiness review results;
- Data storage plan, data communication plan, and data storage platform.

These procedures are described in detail in the following sections. The data management plan has four elements: (1) sample designation system, (2) field activities, (3) sample tracking and management, and (4) data management system.

2   Sample Designation System

A concise and easily understandable sample designation system is an important part of the project sampling activities. It provides a unique sample number that will facilitate both sample tracking and easy resampling of select locations to evaluate data gaps, if necessary. The sample designation system to be employed during the sampling activities will be consistent, yet flexible enough to accommodate unforeseen sampling events or conditions. A combination of letters and numbers will be used to yield a unique sample number for each field sampled collected. The sample designation system will be used by field personnel to assign each sample with a unique sample identification number.

Examples of sample type codes are as follows:

- Residential/Commercial/Agricultural Soil Sampling: SS-01_A_0-0.1_20230301_A1
    - "SS" prefix to be used for both the surficial soils scrape or 0 to 1 inch and 1 inch to 6 inch sampling intervals, with -01 used for the first sample at a specific property, -02 for the second, etc.
    - A code for the type of sample will then follow the prefix (i.e., A=Ash in sample; B = background; R = random with no ash in sample)
    - Sampling interval in feet follow the sample code (i.e., 0-0.1 or 0.1-0.5)
    - Sample date follows the depth interval in YYYYMMDD
    - Grid location-specific parcel ID number, assigned sequentially during sampling to minimize use of personally identifying information, follows the date (e.g., A1)
- Main Line Interim Soil Removal Confirmation Soil Samples: CON-01-ML1-A1-(0-2)-20230301
    - "CON" prefix used to reflect a confirmation soil sample
    - The numerical value (i.e., 01) reflects the associated grid location
    - ML1 represents main line track 1 (southern track) and ML2 reflects main line track 2 (northern track)
    - The depth interval (i.e., 0-2) indicates the depth from the base of the excavation that the sample was collected from in inches
    - Sample date follows the depth interval in YYYYMMDD
- Sediment Samples: SED-05-20230301
    - "SED" prefix used to reflect the sample matrix is sediment
    - The numerical value (i.e., 05) indicates the sample location
    - Sample date follows the numerical value in YYYYMMDD
- Groundwater Samples: MW-1-20230301
    - "MW" prefix used to reflect the sample is from a monitoring well
    - The numerical value (i.e., 1) indicates the monitoring well number
    - Sample date follows the numerical value in YYYYMMDD
- Waste Characterization Samples: WC-S-Track-01/20230301
    - "WC" prefix used to reflect a waste characterization sample
    - A code for the type of sample typically follows the prefix (i.e., S=Soil, L=Liquid)
    - A sample location identified (e.g., Track) may be used

– Sample date follows the location identifier in YYYYMMDD

Field duplicate samples will be submitted blind to the laboratory with no indication of the parent sample location. Duplicate samples will be identified as DUP-XX-YYYYMMDD, or similar.

Blanks will be identified as follows:

- Equipment blank: EB-XX-YYYYMMDD, or similar
- Trip blank: TB-XX-YYYYMMDD, or similar

Detailed descriptions of the sample identifications will be recorded in the field log.

3   Field Activities

Field activities designed to gather the information necessary to make decisions require consistent documentation and accurate record keeping. During site activities, standardized procedures will be used for documenting field activities, data security, and QA. These procedures are described in further detail in the following subsections.

- Field Documentation. Complete and accurate record keeping is a critical component of the field activities. When interpreting analytical results and identifying data trends, investigators realize that field notes are an important part of the review and verification process. To confirm that all aspects of the field investigation are thoroughly documented, several different information records, each with its own specific reporting requirements, will be maintained, including field logs, instrument calibration records, and chain of custody (COC) forms.
- Data Security. Measures will be taken during the field investigation to prevent samples and records from being lost, damaged, or altered. When not in use, all field notebooks will be in the possession of project personnel. Access to these files will be limited to the field personnel who utilize them.
- Sample Tracking and Management. A record of all field documentation will be maintained to provide verification of the validity of data used in the site analysis. To effectively execute such documentation, carefully constructed sample tracking and data management procedures will be used throughout the sampling program.

  Sample tracking will begin with the completion of COC forms. Copies of all completed COC forms will be maintained in the field office. The laboratory will verify receipt of the samples electronically (via email) on the following day.

  When analytical data are received from the laboratory, the incoming analytical reports will be reviewed against the information on the COC to confirm that the correct analyses were performed for each sample and that results for all samples submitted for analysis were received. Any discrepancies noted will be promptly followed up with the laboratory.

4   Data Management System

In addition to the sample tracking system, a data management system will be implemented. The central focus of the data management system will be the development of a personal computer-based project database. The project database will combine pertinent geographical, field, and analytical data. Information that will be used to populate the database will be derived from surveying sampling locations, field observations, and analytical results. Each of these sources is discussed in the following sections.

Data Management Plan
East Palestine Train Derailment Site

- Field Observations. An important part of the information that will ultimately reside in the data management system for use during the project will originate with observations that are recorded in the field logbook.

  The field logbook will include the locations sampled, the sampling methodologies used, QA/QC procedures, sample identification numbers, equipment decontamination procedures, personnel involved in the activity, and any other noteworthy events that occurred.

  Field logbooks are valuable tools to keep project personnel informed on the details of the field activities and are also invaluable during the development of the required reports. Each field logbook will be reviewed for accuracy and completeness by the respective sampling activity manager. As appropriate, information included in the field logbook will be used to transfer field observations into the data management system.

- Analytical Results. Analytical results will be provided by the laboratory in digital format. The data packages will be examined to confirm that the correct analyses were performed for each sample submitted and that all of the analyses requested on the COC form were performed. If discrepancies are noted, the laboratory will be contacted to resolve any issues.

  The individual electronic data deliverables (EDDs), supplied by the laboratory in EQuIS four-file format, will be loaded into the appropriate database. Any analytical data that cannot be provided by the laboratory in electronic format will be entered manually. After entry into the database, the EDD data will be compared to the field information previously entered into the database to confirm that all requested analytical data have been received.

- Spatial data utilizing ERIS ArcGIS software including ArcGIS Pro and ArcGIS Online Platform to create site web maps by:

  o Compiling GIS data from multiple data sources such as CAD, MS Excel, PDF documents, GPS devices, and ArcGIS Online

  o Creating and managing GIS data in file geodatabases and SDE geodatabases

  o Executing geospatial analyses using Spatial Analyst, 3D Analyst and other ESRI desktop extensions

  o Creating report quality maps

  o Publishing GIS data online, configuring web maps, and building GIS web applications.

- Data Analysis and Reporting. A valuable function of the data management system will be the manual generation of tables of analytical results during report preparation. Tables of analytical data will be produced as part of data interpretation and reporting tasks and will include a comparison of the analytical results to the applicable investigation standards.

Appendix A

Standard Operating Procedures

Loading Data To EQuIS

Rev: 5

Rev Date: 1/6/2020

ARCADIS

Approval Signatures

Prepared by:

_____   _____
Name (Preparer)   Date

Reviewed by:

_____   _____
Name (Subject Matter Expert)   Date

1 Scope and Application

This best practice is the Arcadis method for loading data to EarthSoft's EQuIS environmental database. It reflects the most cost effective and accurate method to load data.

2 Personnel Qualifications

Only data managers in the Information Management department should load data. These staff demonstrate appropriate knowledge of both database structure and environmental data in general.

3 Acronyms

dt_ - an EQuIS data table. Data tables contain project specific information. For instance dt_location has a list of locations for each facility. Every EQuIS data table, includes a facility_id column, which identifies the facility the data is associated with. All locations for every facility are stored in the same table, using facility_id to distinguish between project sites.

EDD – Electronic Data Deliverable. A file of data in a specific format designed for load to a database. This is typically one or more text files or an Excel workbook with specific column names, data types, required fields and reference values.

Pro – EquIS Professional interface, a client-side interface to EQuIS for data management

rt_ - an EQuIS reference table. Reference tables are lookup codes not associated with any specific facility. For instance, rt_analyte has a list of cas_rn and chemical names which is shared for all EQuIS facilities. New reference values can be added, and they will be available for all projects.

st_ - an EQuIS system table. System components such as users, data load information, and reports are stored in tables which are not associated with any particular facility. For instance, st_report lists reports available in EQuIS. St_edd_batch lists every EDD loaded to EQuIS.

4 Equipment List

The data manager must have an EQuIS Enterprise login. The data manager should have EQuIS Professional installed. A copy of the Microsoft Access data pre- processor file and have created the ODBC read-only link to EQuIS. The data manager should be assigned a user role that is appropriate for the required activities.

5 Cautions

Not applicable.

6   Procedure

6.1   Loading New Data

1. Data for EQuIS should be loaded from an EDD, rather than typing new records directly into the data tables in the database. Loading data through an EDD adds a new record to table st_edd_batch table. st_edd_batch assigns an integer eBatch number to each EDD and stores information about the EDD, such as the load date, EDD type, EDD file name(s), and the machine or login which processed the load. When data is loaded to any dt_ or rt_ table, the eBatch number is saved to the eBatch field in the destination dt_ or rt_ table. So, each record in dt_ and rt_ tables should have an eBatch value which can be used to track details of when and how the file was loaded, as well as the person responsible.

2. EQuIS EDDs should be stored on network drives so that the EDDs are backed up and preserved, both as a project record and an available reference. Since st_edd_batch tracks not only the name of the file uploaded, but also its folder and drive, the EDD should be loaded from its network location so the network drive and folder where the file can be found will be stored in EQuIS as part of the load record.

3. The laboratory chosen for analysis should be capable of producing an EQuIS EDD which is accurate, complete, timely, and which meets all ARCADIS EDD specifications and reference value requirements. Laboratories shall be provided a copy of the ARCADIS Lab SOP and a current list of reference values (with updated lists provided as needed) so that they can adhere to our reference value needs. To generate a current list of reference values for lab data (note that reference values are the same for all EQuIS facilities): open EQuIS Pro and connect to any facility. Open EDP. Open the EFWEDD format. Click the office button in EDP, and select Save As…, then Reference values (.rvf).This brings up a pop-up window. On the popup, select a location where the values should be saved, then select the file type, either .rvf or .xls. The .rvf file is used by labs that use EDP to check data. The .xls file is of course Excel and easily viewable by anyone.

4. The field team is responsible for meeting the sample naming scheme agreed on by the project team and data manager and for filling out the chain of custody accurately. If any corrections are needed, such as corrections for mislabeled samples or sample IDs misread by the lab, etc., they are responsible for providing the lab with corrected information so that the lab report and EDD will match. The field team should check the sample IDs on the lab's acknowledgement or web site and if any samples were mis- entered, contact the lab immediately for correction, before the lab report is completed. Continued field issues should be escalated to the Project Manager and data warehousing sub-discipline lead.

5. Laboratories are responsible for checking their data before submitting an EDD. The lab should be using EDP to check each EDD for format specification and adherence to reference values. They are responsible for accuracy and completeness based on the information they have, not field information such as the parent ID of a blind field duplicate. Any completeness issues or EDD spec failures found in the EDD should be immediately reported back to the lab. The lab is responsible for providing a corrected EDD. Continued issues should be escalated to the Lab Program Manager, and data warehousing sub-discipline lead, and the Project Manager.

6. The EDD format should be an EQuIS recognized EDD. The preferred format is:
   - For lab analytical data, the ARC_EFWEDD (a.k.a. 4-file EDD)

- For field parameters (DO, pH, Turbidity, etc., but not water levels), the ARC_EFWEDD. Note that this data will be stored in the dt_sample, dt_test, and dt_result tables, so it can be easily presented in tables alongside lab analytical data.

- EzEDD and ESBasic are not preferred formats for lab analytical and field parameter data because they do not include important metadata fields, such as sys_loc_code (for EzEDD), sample depths, task_codes, etc. If the laboratory cannot provide an ARC_EFWEDD which meets our requirements, it should be escalated to the sub- discipline lead and the project manager. Failure to use ARC_EFWEDDs for data load incurs additional time and therefore additional cost to load data.

- For water levels data, if there is no free product, the Water Levels EDD is acceptable. If free product is present, the dt_water_level tab in the data_tables format is preferred. NAPL thicknesses should not be loaded to the dt_product_thickness table, because that table is not included in EQuIS' water levels reports. Instead, the depth to NAPL columns in dt_water_level should be provided. The remarks field can contain any non-numeric NAPL data, such as "Sheen", as well as any other pertinent remarks ("Dry", "Not accessible", "product present").

7. Before each EDD load, check data in it for completeness and adherence to database specifications. The goal is that before the data is loaded, and before EQuIS EDP is first engaged, the data will already be checked, error- free and complete.

The data should be checked by loading into the Microsoft Access pre- processor database and running the saved queries to test potential data issues. Each project should have a separate copy of the pre-processor. Most queries are pre-built in the template pre-processor and should be run for every data load for every project. If special issues ever occur for an EDD, a new query should be immediately created and saved in the project-specific copy which would capture the potential error (even if the query is created after the error is resolved). The new query should be run against each new data load, to prevent recurrence.

The reason for pre-checking the data with in-house database queries rather than relying on EDP is that EDP checks for certain known issues as determined by Earthsoft, but in-house queries can be customized to cover project-specific needs and additional issues which may or may not be embedded in the EarthSoft EDP code.

In addition, our in-house queries can include update queries, so that if data does require modification, it will be updated in a fast, consistent, and documented manner.

Once the pre-check and update queries are written, they can be run very quickly to maintain efficiency in loading data.

The following should be checked for each EDD prior to attempting to load it to EQuIS, and prior to loading it into EDP:

#	Task	Complete
1	Confirm data is in the expected EDD format, per the bullets above.	☐
2	Confirm that all required fields are present, and no required values left null.	☐
3	Confirm that data meets data type requirements (float, integer, datetime, text, and character length not exceeded for text fields.)	☐
4	Confirm that data associated with reference tables contains expected values. If any new reference values are present, check whether an existing reference value is more appropriate, and if a new reference value must be added to EQuIS, request it from the reference value manager prior to load.	☐

#	Task	Complete
	Unless the reference value is genuinely new, refer the issue back to the laboratory for re- submittal.	
5	Confirm that data associated with parent tables contains expected values. (For instance, sys_loc_codes listed in water levels or EFWEDDs must be present in dt_location with the same spelling). Assign parent sample IDs to field duplicates. Refer any issues to the field staff.	☐
6	Confirm that all uniqueness rules are met.	☐
7	For lab and field parameter data, check that rules for reporting non-detects/detects are met. For non-detects, result_value should be null, detect_flag should be N, and qualifiers should be consistent (e.g., U is acceptable, but J is not) For detections, result_value must not be null, detect_flag should be Y, and qualifiers should be consistent (e.g., UJ is not acceptable, but B or a blank flag is acceptable)	☐
8	For lab and field parameter data, confirm that there is one and only one reportable result for each unique combination of sys_sample_code, analytic_method, fraction, and cas_rn.	☐
9	For EDDs loading data to multiple tables (e.g., lab and field parameter data), check for widow and orphan records.	☐
10	Confirm that data is complete:	☐
10a	Lab analytical EDDs should contain all the expected samples, methods, and analytes	☐
10b	Field events and water levels data should include all expected parameters and locations. Check the EDD samples against the work plan. If a standard method and parameter list is used for periodic sampling, load the list to a new table in the pre-processor and write a query to check completeness.	☐
10c	Lab analytical data should be updated as necessary to provide or update information which cannot be received from the lab, such as inserting sys_loc_codes, task_codes, start depth/end depth/depth units, correcting matrix codes and sample_type_codes as needed, filling in missing sample_delivery_groups, and providing parent_sample_codes for field duplicates.	☐
10d	Any additional project-specific metadata should be inserted as needed.	☐
10e	Any known EDD issues for the lab or projects must be checked as well. For instance, if a previous load failed due to non-standard values provided in one of the EDD fields, that field should be checked going forward.	☐
11	Spot check a small portion of data against the lab report for accuracy. For lab/projects where previous data quality has been extremely high, one sample per job should be checked. However, if EDDs for this project and/or lab have been problematic recently, a more thorough QC should be applied. Also inform the project manager of the situation so that they can determine whether the lab should continue to be used.	☐

8. If errors or incompleteness are found in the EDD (other than issues such as missing sys_loc_code, where it is not expected that the lab supply this information), it must be corrected before loading.

- If the issue discovered was not picked up by the current pre-check queries, immediately design a pre-check query which would capture this issue. For example, add a query which tests for analysis dates greater than June 1, 2079. All future loads should be tested for this issue.

- For lab data, contact the lab immediately to inform them of the issue and request a corrected EDD. If this is done verbally, follow up with an email or other written notification of the issue. Make sure the

description is explicit and gives a clear statement of the mistake and of the suggested correction(s). For instance, "bad cas numbers" will probably require clarification, but a clear message is "on line 22 of file j153.res the chemical name Arsenic was provided, but the cas_rn field was left blank. The correct cas_rn for Arsenic is 7440- 38-2."

- When the corrected EDD is received, check all the normal issues again as well as checking that the corrections requests have been properly applied.

- Correcting the data manually or modifying the lab data at ARCADIS is not a best practice unless no other alternative is available.

- Modifying data by hand is less accurate and can lead to new errors.

9. Once data is checked and error-free, it is ready to load.

10. By preference, EFWEDD data (e.g., lab analytical and field parameter data) should be uploaded through the EQuIS Enterprise interface rather than through EQuIS Professional, for the following reasons:

- Loading through Pro uses the client PC resources, so while EDP is creating and committing a package, the end user can't use his or her computer for other tasks. For large EDDs, the time lost can be upwards of 20 minutes or more per batch. Cancelling out of a large process can cause issues requiring a reboot.

- Enterprise uploads are shared on the Enterprise dashboards of administrators, and can trigger alerts to other users. For instance, a project manager or client can be automatically notified of a load if it is loaded through Enterprise. The same alert cannot be triggered for Pro loads, and Pro loads will not appear on the Enterprise dashboard, although st_edd_batch will still be populated.

- Enterprise allows a greater number of users, so using Enterprise whenever possible reduces congestion. Save the use of Pro for tasks which can't be accomplished via Enterprise.

11. EDDs that are very large (i.e., >25,000 dt_result records) should be broken up into separate smaller EDDs for submission. Very large EDDs can cause a bottleneck and tie up the entire database.

12. Historical data is often received as a one-time submission from another consultant. Data received from a 3rd party in this way may contain a significant number of EDP errors. It is recommended that EDDs of this type be reviewed for errors using the integrated EQuIS Pro EDP. Once the EDD is proven to be error free, load via. Enterprise. This will insure that the EDD is error free.

13. Load the data through the preferred interface (Enterprise or Pro). If any new issues occur, immediately add queries to check/correct the issue into the pre-processor query sequence. Correct the data, and try the load again. If loading a new EDD trial through Enterprise, EQuIS requires that the new attempt is assigned a new EDD name, e.g., J053_trial2.

14. Once the load is successfully completed, check the number of new rows in EQuIS against the number of rows in the EDD. This can be done either by filtering a data table for the new eBatch (if the EQuIS data tables are very small), or for larger projects, by running a report for the new EDD and counting the output rows. The counts should match. If not, determine the reason for the difference (pass-through queries are helpful in some cases),rollback the old EDD, and re-load with corrections so that all the rows load. Examples of issues causing a load failure (not intended to be a complete list):

- "#" symbol indicates a comment row for EQuIS. Therefore, sys_loc_codes such as "#1 Fuel tank" will be treated as comment rows. They will not load but will not generate an error.

- Datetime fields in EQuIS are of smalldatetime data type (this data type exists in SQL Server but not in Access), so dates must be between January 1, 1900 and June 6, 2079. Dates outside this range will not generate a data type error in access and do not generate an error in EQuIS EDP, but will fail on merge.
- If sys_loc_codes in water level or field/lab analytical data are not an exact match to dt_location, they will not generate an error in EQuIS EDP, but will fail on merge.

15. Use the EQuIS crosstab utility to generate a simple crosstab report for the new EDD. Check that data has loaded as expected and is complete and correct.

6.2 Modifying Existing EQuIS Data

1. Except for the addition of validation qualifiers, any data changes/corrections should be tagged in an EQuIS field. Generally, these tags belong in the remarks field of the table which was changed. However, if that field is used for something else for the specific project, one of the custom fields in the table can be employed instead. The tag should state:

   - the date the data was changed,
   - the initials of the data manager who changed the data, the field changed,
   - the old value,
   - the new value, and
   - the reason for the change.

   If the data was changed and tagged before, the new tag should be appended to the old one, rather than replacing the old tag.

   Example tag:

   "Result updated from 7.5 to 75.0 per comparison to lab report by PJF 1/06/2020"

2. Choose an appropriate update method as follows:

   - For one or two records in a table, make the changes manually through the Pro interface, by directly editing the data table.
   - For less than 1000 records or so (the exact number should correspond to no more than a 5 minute wait or so in Pro for the EDD to commit), use an EDD to update database data, loading via Pro with the appropriate commit mode:
     o Insert and Replace
     o Insert and Merge
     o Insert and Update

   The updated text for remarks should be embedded in the EDD. If the remarks field for the given table is not accessible from the original EDD (for instance, the remarks field of the dt_test table is not accessible from ARC_EFWEDD), use an alternate EDD format such as data_tables.

   - When changing a large number of records (too many for Pro to accommodate in a timely manner), work with the EQuIS database administrator to design and run queries in SQL Server to make the update. The SQL scripts should be heavily commented to explain what was done and why, what IDs stand for (e.g., Facility_id 1117 = Schlage). The SQL scripts should be saved on the network in the project folder.

3. Once the changes are complete, use the EQuIS crosstab utility to generate a simple crosstab report for the corrected data. Check that data is updated as expected and is complete and correct.

7   Reference

The most up to date EDD format files, EDP, Lab SOP and reference value file may be downloaded at the EarthSoft link here: https://earthsoft.com/products/edp/edp-format-for-arcadis_us/

Modified from EDD naming rules for EQuIS Enterprise EDDs (from EarthSoft's online documentation):

EDD Package Naming Convention

Regardless of the method of EDD Submittal, EDD Packages must be named using a specific naming convention to ensure that Enterprise EDP recognizes the data and loads the data into the correct facility. As explained above, an EDD Package is comprised of a .zip file that includes one or more text (.txt) EDDs and a current **User Certificate**. The naming convention that is standard for Enterprise EDD Packages is outlined below.

ZIP File Name:

<Unique ID>.<Facility Code>.<Format Name>.zip

Flat Text File EDDs Name:

<Unique ID>.<EDD Section Name>.txt

Where:

<Unique ID> = A unique identifier such as the date or Sample Delivery Group name.

<Facility Code> = The facility code for the facility to which this EDD will be loaded.

<EDD Section Name> = The name of the section within the EDD (i.e. EFW2FSample, EFW2LabTST, etc.)

For example, you might have a zip file named "20060425.SPRINGFIELD.ARC_EFWEDD.zip" that contains "20060425A.EFW2FSample.txt" "20060425A.EFW2LabTST.txt" "20060425A.EFW2LabRES txt" '20060425A.EFW2LabBCH txt'"user.usr"

Naming Convention Rules:

- Between each of the name elements is a "." (period). It is very important that it is a period and not a "-" (dash), "_" (underscore), or any other character.
- If the "facility_code" is not entered exactly, or the period is not included between the elements, the EDDs will be rejected because Enterprise will not recognize the facility to load the data in the EQuIS Database.
- The files contained within the ZIP file **must** include the EDD Section name. There may be more information in the names as long as the EDD Section name is separated from the other information with a **period**.

Package Resubmittal

If errors are made in the EDDs and reported during the **Create** or **Commit** step of the Enterprise EDP Workflow process, EDD packages may be resubmitted. However, in order to resubmit corrected EDDs, the .zip file and text (.txt) EDDs must each be renamed.

Example: A lab originally submits an EDD Package (.zip) file named "05302006.Springfield.EFWEDD.zip" which contains EDDs named "05302006.EFW2FSample.txt," etc. If the lab later makes a change to one of the EDDs, it would have to submit a new EDD Package named "05302006_v2.Springfield.EFWEDD.zip" with EDDs named "05302006_v2.EFW2FSample.txt,"   etc.

EQuIS Lab Standard Operating Procedure

Rev: 9.4

Rev Date: 12/21/2018

SOP VERSION CONTROL

9.1	04/04/2017	-	Updated format style	PJF
9.2	09/26/2017	-	Updates to reflect staff changes	PJF
9.3	12/19/2018	16, 17	Radiological analysis requirements	PJF
9.4	12/21/2018	29	Add link to the "EDP Format for Arcadis_US" webpage.	PJF

ARCADIS

Approval Signatures

Prepared by:

_____   _____
Name (Preparer)   Date

Reviewed by:

_____   _____
Name (Subject Matter Expert)   Date

ARCADIS

1   Introduction

Arcadis manages and verifies/validates analytical data generated by commercial analytical laboratories in the EQuIS database (product of Earthsoft, Inc.). All laboratories contracted by Arcadis or their clients, on a site-by-site basis, may be required to submit electronic data deliverables (EDDs) in addition to the hard copy report. This Standard Operating Procedure (SOP) describes the structure, format, and submission requirements for EDDs in the EQuIS EFWEDD (Sample, Test, Result, Batch) format.

This document is a general guidance for preparation of the required electronic data and associated quality control information. The structure of the EDD as defined in this document will remain constant unless EarthSoft modifies the database structure. Reference values and requirements for population of additional fields with specific information will not change from project to project.

Modification to reference value lists may NOT be made by the laboratory without authorization from Arcadis.

Section 2 provides Arcadis contact information and the procedure to submit electronic deliverables directly via e-mail. However, all EDDs will be required to be submitted in a final compilation for each specific sampling event or as directed by the Arcadis Project Manager (PM).

Section 3 outlines the table structures and general requirements of the EDDs. The EDD structure is based on EarthSoft's EFWEDD EDD format. EarthSoft's EDD format has not been changed; however, some 'optional' fields identified in the EarthSoft EDD have been modified to be 'required' in this EDD format. Additional information regarding the EarthSoft products can be found at http://www.earthsoft.com/.

Section 4 presents some additional explanation and requirements for populating the table structure and population set forth in Section 3.

Section 5 summarizes the use of the EDP. Each laboratory **MUST** use EDP to check each EDD file set prior to submission to Arcadis. The EDP Error Report must be submitted with the EDD. *All errors identified by the EDP routine must be corrected prior to forwarding the files for entry into the EQuIS database. Or approval for submittal with errors must be authorized by ARCADIS.*

2   Contact Information

Laboratories should contact the Arcadis National Program Lab Managers with questions regarding this document. The contact info is as follows:

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		dennis.capria@arcadis.com

2.1 Electronic Laboratory Data Checker EDP

Prior to submitting an EDD to Arcadis, the EarthSoft EDP must be run to check and verify the EDD structure, format and reference value compliance. The EDP report must be submitted for each file with each EDD set. The Data Checker error report, which demonstrates that the EDD files were successfully checked, must be electronically submitted with the four EDD files to Arcadis.

2.2 Reference Values

A specific set of values is required to be utilized in populating certain key fields of the EDD. The Reference Value Lists for the EDP will be provided for each Arcadis subcontracted laboratory. The Reference Value Lists must be utilized as provided. Alterations or additions to the Reference Values are **NOT** allowed **without prior** written authorization by the Arcadis Data Manager. Electronic mail may be considered written authorization.

2.3 EDD Submission

Prior to submission to Arcadis, each data file must also be reviewed by the laboratory to ensure that the sample IDs, dates, times and other inter-related information is consistent between all four (4) files and the EDD is complete. All parameters that are subcontracted to other laboratories must be included in the EDD for a specific SDG or Laboratory Project Number. It is not acceptable to submit separate EDDs for subcontract parameters. Manual review of the files may be necessary to complete this review.

It is **IMPERATIVE** that the EDD results match the hard copy results. If the results do not match the lab will correct the error ASAP at no additional charge. This includes issues involving various rounding routines for different electronic data management programs within the laboratory (i.e. LIMS vs. EPA CLP). Significant figures must also match hard copy and be consistent from one sampling event to the next. Reporting limits must be consistent between events as well and must be in compliance with the Laboratory Task Order or Project Statement of Work. There may be instances where diluted surrogates and unrecovered spike compounds will require population of the EDD with numeric values in lieu of data flags in the hard copy report. The Arcadis Data Manager will provide project specific guidance for these conditions. Adherence to the SOP requirements for population of spike/surrogate recovery and RPD fields is required to allow electronic validation of the data.

The EDP Reports for each file must be submitted with the 4 files of the actual EDD.

Laboratories must submit EDDs via e-mail for verification of compatibility and completeness to the assigned Arcadis Data Manager for the project.

The subject line of this e-mail must include the following text:

[Facility-Code] [Laboratory Project/Log/SDG Number] - EDD Submission

The e-mail should also include the laboratory contact name and phone number.

EDDs must be submitted via e-mail prior to or at the same time the final hard copy document is delivered. Arcadis may review the EDDs prior to requesting final submittal. EDDs will be returned to the laboratory for modifications until the files can be successfully imported into the EQuIS Project Database and Electronic Data Validation can be performed without field population errors. Any revisions to the EDD will be required within 24 hours of notification to the laboratory regarding observed problems with the EDD. When the EDD is acceptable to

the Arcadis Data Manager and Project Manager, all final versions of the EDD should be submitted to Arcadis for archiving.

Invoices for analytical work will not be approved for payment until the final EDD revisions are acceptable.

3 Electronic Deliverable Data Format

This section identifies the structure and format requirements for EQuIS EFWEDD EDDs submitted by all laboratories to Arcadis. Specific field definitions are presented for each of the four files. Laboratories should review the unique requirements for these fields. The format population and adherence to the criteria are mandatory. Data are electronically verified and errors are quickly identifiable if the EDD is incorrect.

3.1 General Formatting Requirements

All laboratory data must be saved as an ASCII file format using the following standard format. Each subcontracting laboratory's data must be incorporated into the primary laboratory's EDD.

Each data field must be either separated by tabs or enclosed in double quotes (") and separated by commas. Data fields that do not contain information may be represented by two commas. Maximum length of text fields is indicated in the parentheses. If the input information is less than the maximum field length, **DO NOT ADD** spaces to account for the difference.

Each record must be terminated with a carriage return/line feed (i.e., standard DOS text file). The file can be produced using any software with the capability to create ASCII files.

THE LABORATORY SHALL LEAVE THE HEADERS IN EACH ASCII FILE TO ASSIST IN REVIEW AND RESOLUTION OF ERRORS.

Four files are required for each SDG or Laboratory Project Number: one each for samples, tests, results, and batches. Each file must be saved as a Tab Delimited or Comma Separated file.

Enterprise EDD File Naming Conventions

EDD packages must be named using a specific naming convention. An EDD Package consists of a .zip file containing the text (.txt) EDDs and a User Certificate. The zip file and text file names must contain the specific elements listed below under file naming conventions, separated by a period. A User Certificate file will be supplied to the lab by Arcadis for inclusion in the zip file. Please include in the subject line of emailed EDD submissions the facility code and Sample Delivery Group (SDG) number.

File Naming Conventions:

ZIP File Name = Unique ID.Facility Code.Format Name.zip

Text File EDDs Name = Unique ID.EDD Section Name.txt

Unique ID = SDG number.

Facility Code = The facility code (i.e., Site Name from ENFOS)

Format Name = The EQuIS EDD format name (e.g., ESBasic, EFWEDD, etc.).

EDD Section Name = The name of the section within the EDD (e.g. EFW2FSample, EFW2LabTST, etc.).

For example, ZIP File Name = "2009001.BP-99999.EFWEDD.zip" will contain the following files: "2009001.EFW2FSample.txt", "2009001.EFW2LabTST.txt", "2009001.EFW2LabRES.txt", and '2009001.EFW2LabBCH.txt' .

Package re-submittal

In order to re-submit corrected EDDs, the .zip file and text (.txt) EDDs must each be renamed. If the example EDD package above were to be re-submitted it would have ZIP File Name = "2009001B.BP-99999.EFWEDD.zip" containing "2009001B.EFW2FSample.txt", "2009001B.EFW2LabTST.txt", "2009001B.EFW2LabRES.txt", and '2009001B.EFW2LabBCH.txt'. Note that a "B" has been appended to the SDG name in both the zip file name and each of the text file names. A subsequent re-submittal of the same SDG would require that a C be appended and so on.

Referential integrity is enforced between tables (e.g. sys_sample_code present in the result, batch, and test tables must also be present in the sample table). For example, a data record with a specific sys_sample_code found in the result table, but not in the sample table, will cause and error in the Data Import Module and the file will not be allowed to be entered into the database. Dates and times associated with each test must match in the "Test" and "Result" files or the database will not allow entry of the entire file.

Reference values must be adhered to for a variety of fields as identified in the Reference Value list and described in the following table format requirements.

3.2   Format Details

The following four sections provide a detailed summary and the specific layout for each field required in each of the four (4) tables of the EDD. The Arcadis EDD has been derived from the EarthSoft EFWEDD EDD.

Date is reported as MM/DD/YY (month/day/year) and time as HH:MM (hour:minute). Time must be reported in 24-hour (military) format (3:30 p.m. = 15:30 and 8:30 AM = 08:30 not 8:30). NOTE: Make certain that the LIMS systems format the date and time the same way for all files.

The columns in the following 4 tables relate to:

"**Number**" Column in Tables = Column of EDD table

"**Attribute Name**" = Column Name

    PK after attribute indicates this is a primary key within Access for the table.

"Column Data" Type = Text or Numeric values required. Parenthetical number indicates total allowable number of characters in the field.

"**Required**" Column:

The column titled 'Required' will contain the text 'Yes' if the field is required to be populated by the laboratory. In addition, a "condition" is added to indicate additional information applying to population of the associated field. The first number of the condition relates to the table in which the condition applies, i.e. 1 is the Sample File, 2 is the Test File, 3 is the Result File, and 4 is the Batch File. Conditions apply as follows:

Condition	Table	Description
0	ALL	Field always required
1-1	SAMPLE	Field required for field samples only not required for laboratory samples
1-2	SAMPLE	Field required (parent_sample_code) for **laboratory** QC samples that have 'parents'
1-3	SAMPLE	Field not required for field samples
2-1	TEST	Field required if applicable for specific test
3-1	RESULT	Field required (result_value) for detected analytes only (TRG or TICs). Must be NULL if non-detect or surrogates, internal standards or spiked compounds
3-2	RESULT	Field required if available or appropriate for result
3-3	RESULT	Field required for matrix spikes or matrix spike duplicates (NOT required for surrogate compounds or LCS samples where the original concentration is assumed to be zero).
3-4	RESULT	Field required for surrogate compounds, LCS, Blank Spikes, Matrix Spikes, and Internal Standards.
3-5	RESULT	Field required for LCS duplicates, Blank Spike Duplicates, Matrix Spike Duplicates, Lab Replicates
3-6	RESULT	Field required for LCSD, BSD, MSD, and Lab duplicate samples
3-7	RESULT	Field required for surrogates and spike compounds
4-1	BATCH	Field required if available or appropriate for result

"**REQUIRED**":

"YES" = Required data if applicable

"NO" = Optional information unless otherwise directed by Arcadis Data Manager or preferred for insertion by lab except where lab is specifically directed to leave the field Null.

Parent Sample Definition

Parent Samples are base samples for duplicates or spikes. i.e. original field samples used for matrix spikes or field sample used for Lab Duplicate/Replicate. A Matrix Spike is not the Parent Sample of the Matrix Spike Duplicate.

POPULATING SPIKE FIELDS

SURROGATES**: surrogate recoveries are to be populated in qc_spike_added, qc_spike_measure, and qc_spike_recovery fields. Surrogates are analyte type = SUR. Control limits for surrogate recoveries must also be populated.**

INTERNAL STANDARDS**: internal standard values are to be populated in qc_spike_added, qc_spike_measure, and qc_spike_recovery fields. Internal Standards are analyte type = IS.**

LCS, BS, and MS COMPOUNDS: **recoveries are to be populated in qc_spike_added, qc_spike_measured, and qc_spike_recovery fields. Compounds spiked to evaluate method accuracy are analyte type = SC. Control limits for spike recoveries must also be populated.**

LCSD, BD, AND MSD COMPOUNDS: **recoveries are to be populated in qc_dup_spike_added, qc_dup_spike_measured, and qc_dup_spike_recovery fields. The Compounds spiked to evaluate method accuracy are analyte type = SC. Control limits for spike recoveries must also be populated. Additionally, the qc_rpd and qc_rpd_cl fields must be populated for these samples.**

LAB REPLICATE SAMPLE DATA: **values for lab duplicates/replicates are to be populated in qc_dup_spike_measured field. The qc_rpd and qc_rpd_cl fields must be populated for these samples.**

4   Additional Requirements

Sample Table				
Num	**Attribute Name**	**Column Data Type**	**Required**	**Attribute Definition**
1	sys_sample_code	Text(40)	Yes (0)	Unique sample identifier (COC Sample ID). Each sample must have a unique value, including spikes and duplicates. Unique sample identifiers **throughout** the database are an **ABSOLUTE** restriction enforced by EQuIS Chemistry. This unique identifier also carries through to each subsequent sampling event where the samples IDs must be unique for EVERY event of the project (continuing years). Laboratory QC samples must also have unique identifiers between sampling event and from 1 year to the next and between laboratories in the event subcontractors are used. For Matrix Spike, Matrix Spike Duplicate, and Laboratory Duplicates of Field Samples, add the suffix **MS, MSD, and LR**, respectively to create unique identifiers for these types of Lab QC samples.
2	sample_name	Text(30)	No	Additional sample identification information as necessary. Is not required to be unique (i.e., duplicates are OK).
3	sample_matrix_code	Text(10)	Yes (0)	Code, which distinguishes between different types of sample matrix. **Examples**: Soil samples ="SO" , groundwater samples = "WG". Field Blanks, Trip Blanks, and Rinsate Blanks = "WQ". Water Method Blanks and liquid matrix spikes = "WQ" Soil Method Blanks and soil/sludge/sediment matrix spikes = "SQ' This field refers to the sample matrix not the matrix after preparation or extraction. See rt_matrix for the list of valid values.
4	sample_type_code	Text(10)	Yes (0)	Code that distinguishes between different types of samples. **For example**, normal field samples = "N" and laboratory method blank ="LB". Field QC sample types are Field Duplicates = "FD", Field Blanks = "FB", Trip Blanks = "TB". Lab QC sample types are LCS or Blank Spikes = "BS", LCSD or BS Duplicates = "BD" and Matrix Spikes = "MS" and Matrix Spike Duplicates = "SD". See rt_sample_type in Reference Values list of valid values.

Sample Table				
Num	Attribute Name	Column Data Type	Required	Attribute Definition
5	sample_source	Text(10)	Yes (0)	Must be either "Field" for field samples **or** "Lab" for laboratory QC samples. No other values are allowed. Matrix spikes and lab duplicate/replicate are "Lab" samples, even though the parent is a "Field" and the base sample came from the field. The spiking or splitting for duplication is done in the lab. Field duplicates as submitted to the lab by field sampling teams are "Field"
6	parent_sample_code	Text(40)	Yes (1-2)	The value in the "sys_sample_code" that identifies the sample that was the source of this sample. *For example*, the Matrix Spike and the Matrix Spike Duplicate or Lab Replicates parent_sample_code is the sys_sample_code for the originating field sample that is spiked to generate the MS/MSD or split by the lab for use as the laboratory duplicate. This field is only required in the EDD for laboratory "clone" samples (e.g., matrix spikes and duplicates). Field duplicates are submitted blind to the laboratory, so this field cannot be completed by the laboratory. This field must be blank for samples that have no parent (e.g., normal field samples, method blanks, etc.).
7	sample_delivery_group	Text(10)	Yes (0)	Sample delivery group or laboratory Project/Log Number. All deliverables must reference the SDG or Lab Log-in Number. **This field MUST BE POPULATED**
8	sample_date	Date	Yes (1-1)	Date of sample collection in **MM/DD/YY** format including trip blanks. Must be blank for laboratory samples.
9	sample_time	Time	Yes (1-1)	Time of sample collection in 24-hour (military) **HH:MM** format. 8:45 AM = 08:45 and 3:30 PM = 15:30. Must be blank for laboratory samples.
10	sys_loc_code	Text(20)	No	Sample collection location. To be populated by Arcadis unless otherwise directed at project initiation.
11	start_depth	Double	No	Beginning depth (top) of soil sample. To be populated by Arcadis unless otherwise directed at project initiation.
12	end_depth	Double	No	Ending depth (bottom) of soil sample. To be populated by Arcadis unless otherwise directed at project initiation.
13	depth_unit	Text(15)	No	Unit of measurement for the sample begin and end depths. IRPIMS-style unit of measurement codes (see table X03) are recognized by Chem; other codes may be allowed by the Chem project manager. To be populated by Arcadis unless otherwise directed at project initiation.
14	chain_of_custody	Text(15)	Yes (1-1)	Chain of custody identifier or number. A single sample may be assigned to only one chain of custody. The COC identifier will be provided by the field sampling team based on conventions established for a specific project.
15	sent_to_lab_date	Date	No	Date sample was sent to lab (in MM/DD/YY format for EDD).

Sample Table				
Num	Attribute Name	Column Data Type	Required	Attribute Definition
16	sample_receipt_date	Date	Yes (1-1)	Date that sample was received at laboratory in **MM/DD/YY** format. Must be blank for laboratory samples.
17	sampler	Text(30)	No	Name or initials of sampler.
18	sampling_company_code	Text(10)	Yes (1-1)	Name or initials of sampling company (no controlled vocabulary). "Arcadis" should be entered into this field unless otherwise directed at project initiation.
19	sampling_reason	Text(30)	No	Optional reason for sampling. No controlled vocabulary is enforced.
20	sampling_technique	Text(40)	No (1-1)	To be populated by Arcadis unless otherwise directed at project initiation. Sampling technique. **For example**, low flow, bailing, MIP, etc… Must be blank for laboratory samples.
21	task_code	Text(10)	No	Code used to identify the task under which the field sample was retrieved.
22	collection_quarter	Text(5)	No	Quarter of the year sample was collected (e.g., "1Q96")
23	composite_yn	Text(1)	No	Boolean field used to indicate whether a sample is a composite sample.
24	composite_desc	Text(255)	No	Description of composite sample (if composite_yn is YES).
25	sample_class	Text(10)	No	Navy sample class code.
26	custom_field_1	Text(255)	No	Custom sample field
27	custom_field_2	Text(255)	No	Custom sample field
28	custom_field_3	Text(255)	No	Custom sample field
29	comment	Text(255)	Yes (0)	Field required to contain the full sample ID code.
30	sample_receipt_time	Text(5)	Yes (1-1)	Time of sample receipt by laboratory in 24-hour (military) **HH:MM** format. 8:45 AM = 08:45 and 3:30 PM = 15:30

Test Table				
Num	Attribute Name	Column Data Type	Required	Attribute Definition
1	sys_sample_code (PK)	Text (40)	Yes (0)	SAME AS #1 IN SAMPLE TABLE. This value is used in enforcing referential integrity between tables. Must match sys_sample_code in Sample Table.
2	lab_anl_method_name (PK)	Text (35)	Yes (0)	Laboratory analytic method name or description. See rt_analytic_method in reference value tables for list of valid values.
3	analysis_date (PK)	Date/ Time	Yes (0)	Date of sample analysis in MM/DD/YY format. Refers to initiation of the analysis not prep method date.
4	analysis_time (PK)	Text (5)	Yes (0)	Time of sample analysis in 24-hour (military) HH:MM format. Note that this field, combined with the "analysis_date" field is used to distinguish between reextractions, reanalyses, and dilutions. Please ensure that retests have "analysis_date" and/or analysis_time" different from the original test event (and complete test_type field as appropriate).
5	total_or_dissolved (PK)	Text (1)	Yes (0)	"T" for total metal organic carbon concentration, "D" for dissolved or filtered metal or organic

Num	Attribute Name	Column Data Type	Required	Attribute Definition
				carbon concentration ONLY. USE "N" for organic (or other) constituents for which neither "total" nor "dissolved" is applicable including TDS.
6	column_number (PK)	Text (2)	Yes (2-1)	Applicable for GC or HPLC methods. "1C" for first column analyses, "2C" for second column analyses, or "NA" for analyses where not applicable. If any "2C" tests are listed, then there must be corresponding "1C" tests present also. Laboratories must indicate which of the two columns is to be considered "primary" by entering "Y" in the "reportable_result" field of the result table for the result presented in hard copy reports. It is NOT acceptable to identify both "1C" and "2C" reportable_result as "Y:; one must be "N" if' "1C" and "2C" are provided in the EDD.
7	test_type (PK)	Text (10)	Yes (0)	Type of test. Valid values include "initial", "reextract", and "reanalysis", "dilution" are acceptable. See rt_test_type for al valid values.
8	lab_matrix_code	Text (10)	Yes (0)	Code that distinguishes between different types of matrix analyzed. Soil = "SO"; groundwater = "GW" and TCLP = TCLP as a lab matrix. See rt_matrix for valid values
9	analysis_location	Text (2)	Yes (0)	"LB" for fixed-based laboratory analysis, "FI" for field instrument, "FL" for mobile field laboratory analysis, or.
10	basis	Text (10)	Yes (0)	"Wet" for wet-weight basis; or "Dry" for dry-weight basis. For tests for which this distinction is not applicable use Wet
11	container_id	Text (30)	No	Sample container identifier.
12	dilution_factor	Single	Yes (0)	Test or analytical run dilution factor. **Must** be "1'" if no dilution.
13	Prep_method	Text (35)	Yes (2-1)	Laboratory sample preparation method name. See rt_std_prep_method for valid values.
14	prep_date	Date/ Time	Yes (2-1)	Date of sample preparation in MM/DD/YY format.
15	prep_time	Text (5)	Yes (2-1)	Time of sample preparation in 24-hour (military) HH:MM format
16	leachate_method	Text (15)	Yes (2-1)	Method name, e.g., SW1311 or SW1312. See rt_analytic_method for valid values.
17	leachate_date	Date/ Time	Yes (2-1)	Date of leachate preparation in MM/DD/YY format.
18	leachate_time	Text (5)	Yes (2-1)	Time of leachate preparation in 24-hour (military) HH:MM format.
19	lab_name_code	Text (10)	Yes (0)	Unique identifier of the laboratory reporting results. See rt_subcontractor for valid values.
20	qc_level	Text (10)	NO	Not populated by Lab.
21	lab_sample_ id	Text (20)	Yes (0)	Laboratory sample identifier. A field sample may have more than one laboratory lab_sample_id; however it is limited to only ONE lab_sample_id per method).

Test Table				
Num	**Attribute Name**	**Column Data Type**	**Required**	**Attribute Definition**
22	percent_moisture	Text (5)	Yes (2-1)	Percent moisture of the sample portion used in the specific lab_anl_methd_name test; this value may vary from test to test for any sample. The value must be NUMERIC as "NN.MM", e.g., 70.1% could be reported as "70.1" but not as 70.1%". The database assumes that the number is a "%" and units of measure are not necessary. **NOTE: This field MUST be populated for all soil, sludge, and sediment samples whether or not the value is reported in the hard copy. Use "0" for lab soil QC samples.**
23	subsample_amount	Text (14)	Yes 0)	Amount of sample used for the test. THIS FIELD MUST BE POPULATED
24	subsample_amount_unit	Text (15)	Yes (0)	Unit of measurement for subsample amount. See rt_unit for valid values.
25	analyst_name	Text (30)	Yes (0)	Name or initials of laboratory analyst.
26	instrument_lab	Text (50)	Yes (0)	Instrument identifier.
27	comment	Text (255)	NO	Comments about the test as necessary (Optional).
28	preservative	Text (50)	Yes (2-1)	Indicate preservative or leave blank, if none. **THIS FIELD MUST BE POPULATED IF A PRESERVATIVE WAS IN THE SAMPLE AS RECEIVED FROM THE FIELD OR IF THE SAMPLE WAS PRESERVED BY THE LABORATORY BEFORE PREPARATION AND ANALYSIS.**
29	final_volume	Text (15)	Yes (2-1)	Final amount of extract or digestate.
30	final_volume_unit	Text (15)	Yes (2-1)	Unit of measure for final_volume. See rt_unit for valid values.

Result Table				
Num	**Attribute Name**	**Column Data Type**	**Required**	**Attribute Definition**
1	sys_sample_code (PK)	Text (40)	Yes (0)	SAME AS #1 IN SAMPLE & TEST TABLES. This value is used in enforcing referential integrity between tables.
2	lab_anl_method_name (PK)	Text (35)	Yes (0)	Laboratory analytic method name. Must be same as lab_anl_method_name in Test File. See rt_analytic_method for valid values.
3	analysis_date (PK)	Date/Time	Yes (0)	Must be the SAME AS #3 IN THE TEST TABLE. This value is used in enforcing referential integrity between tables. Date of sample analysis in MM/DD/YY format.
4	analysis_time (PK)	Text (5)	Yes (0)	Must be the SAME AS #4 IN THE TEST TABLE. This value is used in enforcing referential integrity between tables.
5	total_or_dissolved_ (PK)	Text (1)	Yes (0)	Must be the SAME AS #5 IN THE TEST FILE.
6	column_number (PK)	Text (2)	Yes (3-2)	Must be the SAME AS #6 IN THE TEST FILE
7	test_type (PK)	Text (10)	Yes (0)	Must be the SAME AS #7 IN THE TEST FILE

Result Table				
Num	Attribute Name	Column Data Type	Required	Attribute Definition
8	cas_rn (PK)	Text (15)	Yes (0)	Chemical Abstracts Number for the parameter if available. This must be the true CAS # and "not made up". Where CAS #s are not available, i.e. wet chem. Parameters, identifiers will be provided by Arcadis project requirements. See notes at end of section for TIC management. See rt_analyte for valid values. The lab is not authorized to add internally developed "CAS #s" for general chemistry parameters, surrogates, internal standards, TICs. CAS#s used for TICs must be available through an outside source such as "Chemfinder".
9	chemical_name	Text (60)	Yes (0)	Chemical name associated with CAS # in #8. The cas_rn field is the only chemical identifier information actually imported in EQuIS Chemistry.
10	result_value	Text (20)	Yes (3-1)	Analytical result reported for **"TRG" or "TIC"** result_type **ONLY**. Appropriate and consistent number of significant digits must be entered. **MUST BE BLANK FOR NON-DETECTS EXCEPT FOR RADIOLOGICAL DATA. ALL RADIOLOGICAL DATA MUST HAVE A RESULT VALUE.** "SUR", "IS", and "SC" results do **NOT** populate this field (populate the QC fields).
11	result_error_delta	Text (20)	Yes (3-2) [Radiochem]	The uncertainty (UC) of the counting error as listed by standard deviation where "1-sigma" represents one standard deviation and "2-sigma" represents two standard deviations.
12	result_type_code	Text (10)	Yes (0)	Must be either "TRG" for a target or regular results, "TIC" for tentatively identified compounds, "SUR" for surrogates, "IS" for internal standards, or "SC" for spiked compounds.**[LCS, LCSD, MS, MSD, BS, BSD]**
13	reportable_result	Text (10)	Yes (0)	Must be either "**Yes**" for results, which are considered to be reportable, **or "No"** for other results. Used to distinguish between multiple results where a sample is retested after dilution or to indicate which of the first or second column result should be considered primary. For re-analyses and dilutions all results must be entered into the database if hard copy data is provided **BUT ONLY ONE RESULT FOR EACH COMPOUND/ANALYTE MAY BE FLAGGED AS REPORTABLE.**
14	detect_flag	Text (2)	Yes (0)	Either "Y" for detected analytes or "N" for non-detects. **MUST be "N" for NON-DETECTS EXCEPT FOR RADIOLOGICAL DATA. ALL RADIOLOGICAL DATA MUST HAVE A DETECT_FLAG = "Y"**
15	lab_qualifiers	Text (7)	Yes (3-2)	Qualifier flags assigned by the laboratory. See rt_qualifier for valid qualifiers that may be used.
16	Organic_yn	Yes/No	Yes (0)	Must be either "Y" for organic constituents or "N" for inorganic constituents.
17	method_detection_ limit	Text (20)	Yes (0)	Laboratory determined MDL per 40 CFR Part 136, adjusted for dilutions and percent moisture (if it applies).

Result Table			
Num	**Attribute Name**	**Column Data Type**	**Required**	**Attribute Definition**
18	reporting_detection_ limit	Text (20)	Yes (0)	Detection limit that reflects sample analysis conditions including analysis volumes and dilution factors. This should be the laboratory PQL or standard reporting limits. For radiological data the maximum detectable concentrations (MDC) is stored here.
19	quantitation_limit	Text (20)	No	NOT Currently used unless specifically defined for the project.
20	Result_unit	Text (15)	Yes (0)	Units of measure relates to **ALL** results including result_value, qc_original_concentration, qc_spike added, qc_spike_measured, qc_dup_orginal_conc, qc_dup_spike_added, qc_dup_spike_measured. See rt_unit for valid values.
21	detection_limit_unit	Text (15)	Yes (0)	Units of measure for detection limit(s). See rt_unit for valid values.
22	tic_retention_time	Text (8)	Yes (3-2)	Retention time in minutes for tentatively identified compounds (TICs). Populated only for TIC result_type
23	result_comment	Text (255)	NO	MUST BE LEFT BLANK BY THE LAB, unless a project-specific definition for quantitation_limit has been specified (such as "limit of detection"). If the quantitation_limit has been set for the project, please add a comment defining the contents, such as "Quantitation_limit contains the limit of detection".
24	qc_original_conc	Text (14)	Yes (3-3)	The concentration of the analyte in the original (unspiked) sample. Populated for matrix spike samples. Not populated where original concentration is assumed to be zero, i.e. LCS or BS samples.
25	qc_spike_added	Text (14)	Yes (3-4)	The concentration of the analyte added to the original sample. Populated for **ALL** Surrogates, and LCS, BS, and MS samples
26	qc_spike_measured	Text (14)	Yes (3-4)	The measured concentration of the analyte. Use zero for spiked compounds that were not detected in the sample. **MUST BE NUMBERIC** even if diluted out or not recovered (use "0" if diluted, matrix interference, elevated concentrations of target compounds, etc.) Populated for **ALL** Surrogates, and LCS, BS, and MS samples
27	qc_spike_recovery	Text (14)	Yes (3-4)	The percent recovery for "SUR" and "SC" results. **MUST BE NUMERIC** even if diluted out or not recovered (use "0" if diluted, matrix interference, elevated concentrations of target compounds, etc.) Report as percentage (e.g., report "120%" as "120"); DO NOT include "%" sign in field. Populated for **ALL** Surrogates, and LCS, BS, and MS samples
28	qc_dup_original conc	Text (14)	Yes (3-5)	The concentration of the analyte in the original (unspiked) sample. Populated for matrix spike duplicate samples. Not populated where original concentration is assumed to be zero, i.e. LCSD or BSD samples.

Result Table				
Num	Attribute Name	Column Data Type	Required	Attribute Definition
29	qc_dup_spike_added	Text (14)	Yes (3-5)	The concentration of the analyte added to the original sample. Populated for **ALL** LCSD, BSD, and MSD samples.
30	qc_dup_spike_measured	Text (14)	Yes (3-5)	The measured concentration of the analyte in the duplicate. Populated for **ALL** LCSD, BSD, and MSD samples. MUST be NUMERIC. Use zero for spiked compounds that were not recovered due to dilution, matrix interference, elevated concentrations of target compounds, etc..
31	qc_dup_spike_recovery	Text (14)	Yes (3-5)	The duplicate percent recovery. Populated for **ALL** LCSD, BSD, and MSD samples. **MUST be NUMERIC.** Use zero for spiked compounds that were not recovered due to dilution, matrix interference, elevated concentrations of target compounds, etc Report as percentage (e.g., report "120%" as "120").
32	qc_rpd	Text (8)	Yes (3-6)	The relative percent difference between MS and MSD, LCS and LCSD, BS and BSD, & primary field sample result and Lab Replicate. Populated for **ALL** LCSD, BSD, MSD, and LR samples. **MUST be NUMERIC**. Use zero for RPDs that were not calculated due to elevated concentrations of target compounds, dilution, matrix interference, etc Report as percentage (e.g., report "120%" as 120").
33	qc_spike_lcl	Text (8)	Yes (3-7)	Lower control limit for spike recovery. Required for spikes, spike duplicates, surrogate compounds, LCS and any spiked sample. Report as percentage (e.g., report "120%" as "120").
34	qc_spike_ucl	Text (8)	Yes (3-7)	Upper control limit for spike recovery. Required for spikes, spike duplicates, surrogate compounds, LCS and any spiked sample. Report as percentage (e.g., report "120%" as "120").
35	qc_rpd_cl	Text (8)	Yes (3-6)	Relative percent difference control limit. Required for any duplicated sample. Report as percentage (e.g., report "120%" as "120").
36	qc_spike_status	Text (10)	Yes (3-4)	Used to indicate whether the spike recovery was within control limits. Use the "+" character to indicate failure, otherwise leave blank.
37	qc_dup_spike_status	Text (10)	Yes (3-5)	Used to indicate whether the duplicate spike recovery was within control limits. Use the "+" character to indicate failure, otherwise leave blank.
38	qc_rpd_status	Text (10)	Yes (3-6)	Used to indicate whether the relative percent difference was within control limits. Use the "+" character to indicate failure, otherwise leave blank. Required for any duplicated sample.

Batch Table				
Num	Attribute Name	Column Datatype	Required	Attribute Definition
1	sys_sample_code (PK)	Text (40)	Yes (0)	SAME AS #1 IN SAMPLE , TEST TABLE. This value is used in enforcing referential integrity between tables.

Batch Table				
Num	Attribute Name	Column Datatype	Required	Attribute Definition
2	lab_anl_method_name (PK)	Text (35)	Yes (0)	SAME AS #2 IN TEST TABLE. See rt _analytic_method for valid values.
3	analysis_date (PK)	Date	Yes (0)	SAME AS #3 IN TEST TABLE. This value is used in enforcing referential integrity between tables. Date of sample analysis in MM/DD/YY format. May refer to either beginning or end of the analysis as required by EQuIS Chemistry project manager.
4	analysis_time (PK)	Text (5)	Yes (0)	SAME AS #4 IN TEST, AND RESULT TABLES. This value is used in enforcing referential integrity between tables.
5	total_or_dissolved (PK)	Text (1)	Yes (0)	SAME AS #5 IN TEST TABLE. This value is used in enforcing referential integrity between tables.
6	column_number (PK)	Text (2)	Yes (4-1)	SAME AS #6 IN TEST TABLE. This value is used in enforcing referential integrity between tables.
7	test_type (PK)	Text (10)	Yes (0)	SAME AS #7 IN TEST TABLE. This value is used in enforcing referential integrity between tables.
8	test_batch_type (PK)	Text (10)	Yes (0)	Lab batch type. Valid values include "Prep", "Analysis", and "Leach". Additional valid values may optionally be provided by the EQuIS Chemistry project manager. This is a required field for all batches.
9	test_batch_id	Text (20)	Yes (0)	Unique identifier for all and each lab batches. Must be unique within EQuIS Chemistry database. For example, the same identifier cannot be used for a prep batch and an analysis batch and the values must be different from one sampling event to another. THIS IDENTIFIER CANNOT BE USED FROM ONE YEAR TO THE NEXT.

4.1   Additional Information for Preparing the 4-File EDD

SAMPLE FILE AND SYS_SAMPLE_CODE

1. The sys_sample_code is the unique sample ID as supplied on the Chain of Custody form with the same spacing as identified on the COC or on a supplemental Sample ID list submitted to the laboratory with the Laboratory Task Order or prior to submission of samples.

2. In order to uniquely identify MS/MSD, laboratory duplicates, TCLP, and SPLP samples, the laboratory shall add a suffix to the original sample ID listed on the chain of custody:

    Matrix Spike Sample = xxxxx MS

    Matrix Spike Duplicate Sample = xxxxx MSD

    Lab Duplicate/Replicate = xxxxx LR

    TCLP Extract Sample = xxxxx TCLP

    SPLP Extract Sample = xxxxx SPLP

    These are the only characters that are allowed to be amended to ANY sample ID as listed on the COC or the sample ID list referred to above.

The parent_sample_code shall be entered into the parent_sample_code field of the Sample File.

3. If the sample_name field is provided it must contain the full sample ID from the chain of custody.

4. Sample_Type_Code must be appropriately applied as follows:

    "N" = normal field samples

    "FD" = field duplicates samples submitted blind to the laboratory

    "TB" = trip blanks

    "FB" = field blanks

    "EB" = rinsate or equipment blanks

    "BS" = laboratory control samples or blank spikes

    "BD" = laboratory control sample duplicates or blank spike duplicates

    "MS" = matrix spikes

    "SD" = matrix spike duplicates

    "LR" = laboratory duplicates or laboratory replicates

5. The following "**matrix_type**" codes must be used ("**SQ**" = soil QC sample and "**WQ"** = water QC sample):

    Method Blank = "SQ" or "WQ"

    MS/MSDs = "SQ" or "WQ"

    LCS/LCSDs = "SQ" or "WQ"

    BS/BSDs = "SQ" or "WQ"

6. SDG Numbers or laboratory Log Numbers (per Arcadis PM direction) **MUST** be populated in "**sample_delivery_group**" field of the **Sample File.**

QUALITY CONTROL SAMPLES AND DATA

7. The source of Lab Duplicates, Lab Replicates, Matrix Spikes, and Matrix Spike Duplicates is the Lab not the Field even if the MS/MSD are identified on the COC by the field sampling team. The samples are spiked in the laboratory not in the field.

8. Laboratory QC data, which span more than one SDG may be submitted with each appropriate SDG.

9. Laboratory LCS and LCSD should be reported as two separate samples.

10. **Matrix Spike and Matrix Spike Duplicate recoveries must be reported as "0" if the value is not calculated due to concentrations of the spiked analyte in the sample at concentrations above the 4X factor.**

11. **All laboratory method performance site-specific and batch Quality Control sample results (i.e. Method Blanks, LCS/LCSDs, Blank Spikes, Leachate Blanks as method appropriate) must be included in the EDD.** For most projects, this does **NOT** include **non-site-specific** matrix spikes and laboratory duplicates/replicates.

12. Laboratory batch sample duplicate/replicate and MS/MSD results from **non-project specific** samples (i.e. batch QC samples) shall **NOT** be included in the EDD.

13. Surrogates populate the qc_spike fields not qc_dup_spike fields or the result_value field even if the surrogates are reported for MSD, BSD, or LCSD samples.

14. QC_Spike_Added values for Spike, IS and Surrogate compounds are REQUIRED.

15. QC_Spike_Measured values for Spike, IS and Surrogate compounds are REQUIRED.

16. RPDs for LCSDs, BSDs, MSDs, and Laboratory Duplicates must be populated in the "**qc_rpd"** field. A value of "0" or "100" must be reported, as appropriate, if the RPD is not calculated due to excessive concentrations or interference present in the sample. The "**qc_rpd**" must be a numeric entry.

17. The RPD control limit must be listed in the "**rpd_cl"** field for all parameters where an RPD is reported. This includes lab duplicate/replicate samples.

SAMPLE FILE

18. The following "**matrix_type**" codes must be used for QC samples ("**SQ**" = soil QC sample and "**WQ"** = water QC sample):

    Method Blank = "SQ" of "WQ"

    MS/MSDs = "SQ" or "WQ"

    LCS/LCSDs = "SQ" or "WQ"

    BS/BSDs = "SQ" or "WQ"

19. SDG or Laboratory Project numbers must be populated in "sample_delivery_group" field.

TEST FILE

20. Percent moisture must be reported in the "**percent_moisture**" field in the **Test File** for all solid samples (i.e., soil, sediment, and sludge).

21. Subsample weights and final volumes must be listed for all parameters as appropriate.

RESULTS FILE

22. Result_value is only populated with data for "TRG" and "TIC" detections. All other data is entered in the "qc_" fields. The field must be "NULL" for non-detects and other analyte_types. The Reporting Limit must not be entered in this field.

23. Non-detected data shall have a lab_qualifier of "U" in addition to other qualifiers deemed applicable. The Detect_Flag shall be "N" and the Result_value field shall be blank.

24. The Reporting Limit must be provided for all parameters. The RL MUST be adjusted for dilutions made during analysis.

25. Surrogate recoveries MUST BE REPORTED in the qc_spike_measured and qc_spike_recovery fields, even if the surrogate had been diluted out. List "0" as the measured and recovered amount. Control Limits must also be entered for surrogates. Surrogates are "SUR" analyte_type not "TRG".

26. Surrogate, LCS, LCSD, BS, BSD, MS, and MSD detected concentrations, and percent recoveries must be populated with a numeric value. A value of "0" **must** be entered if the Spiked Compound is diluted out or not recovered. An "+" is unacceptable as this is a numeric field.

27. "**QC_original_concentration**" must be populated for matrix spikes and matrix spike duplicates

28. Valid entries for the reportable_result field are "Yes" or "No" only.

29. ONLY report compounds of interest for any method blank, sample, and sample duplicate, trip blank.

30. Laboratory Qualifier designation must be consistent. For an estimated concentration with blank contamination "BJ" must be used. Note that "JB", "B J" or "J B" cannot be used.

31. Explanation of Duplicate Qualifiers:

> B Analyte found in associated blank   Organic Analysis
>
> B <CRDL but >= Instrument Detection Limit   Inorganic Analysis
>
> N Presumptive evidence of a compound   Organic Analysis
>
> N Sample recovery not within control limits   Inorganic Analysis

It is preferred by Arcadis that the laboratory not qualifiers with multiple explanations. **Any qualifiers utilized in the hard copy report or the electronic report must be defined in the hard copy report. There is no exception to this requirement for explanation of qualifiers applied to electronic data.**

32. Nomenclature for tentatively identified compounds (TIC):

> Use the CAS # if it is available and **REAL (outside verifiable source)** for TICs and enter the chemical name in the chemical_name field.
> For UNKNOWN TICs follow the following protocol:
> cas_rn for unknown VOA TIC = VTIC 1 through VTIC 10
> cas_rn for unknown SVOA TIC = SVTIC 1 through SVTIC 20

Enter "UNKNOWN", "UNKNOWN Hydrocarbon", "UNKNOWN Aliphatic", or other identifier as appropriate or applicable in "chemical_name" field.

TICs will produce errors in the ELDC/EDDP that cannot be corrected by the laboratory. These are the only acceptable errors in the data checker report unless otherwise authorized by Arcadis.

33. TCLP or SPLP results must be submitted in units of mg/L or appropriate liquid units. **(Make sure that moisture correction is not automatically enforced).**

BATCH FILE

34. The laboratory must use unique Batch File Names for each analytical department/method and for continuing years. Electronic validation utilizes Batch IDs to link field samples with quality control data. Overlapping Batch IDs are not acceptable.

GENERAL ISSUES

35. Incomplete chain-of-custody (C-O-C) forms must be immediately communicated to the project manager. Some of the C-O-C information is used for completion of the Sample_Matrix_Code and Sample_Delivery_Group. These discrepancies must be rectified upon receipt of samples at the laboratory prior to log in.

36. **Duplicate sample IDs are not acceptable within the EQuIS database. It is imperative that samples including field blanks, trip blanks, equipment blanks, field duplicates have unique sample IDs for projects including ongoing sampling events such as quarterly groundwater monitoring.**

SUBCONTRACTED PARAMETERS

37. The EDD must be populated with **ALL** appropriate and applicable fields, including **ALL** QC data for any subcontracted parameters.

PLEASE CONTACT THE ARCADIS PROJECT CHEMIST, DATA MANAGER or PROJECT MANAGER IF THERE ARE ANY QUESTIONS REGARDING PREPARATION OR GENERATION OF THE EDD.

EXAMPLE EDD REPORTS

The following subsections provide examples of how the EQuIS EDD should be populated for QC data.

RESULT FILE FIELDS FOR A NORMAL FIELD SAMPLE, TRG AND TIC RESULTS

The table below shows some of the fields in the Result File for a normal field sample   (i.e., Sample_type_code = N, TB, FD, etc.) and "TRG" or "TIC" analyte_type_code.   NOTE: all QC fields are blank.

cas_rn	result value	qc original conc	qc spike added	qc spike measured	qc spike recovery	qc dup. original conc	qc dupl. spike added	qc dup. spike measured	qc dup. spike recovery
93-76-5 94-75-7 94-82-6	3.17 1.56 2.31								

RESULT FILE FIELDS FOR A NORMAL FIELD SAMPLE WITH SURROGATES

The following table shows some of the fields in the result file for a normal field sample (i.e., Sample_type_code = N, TB, etc.). Note that QC fields are blank except on surrogate rows.

cas_rn	result value	result unit	result type code	qc original conc	qc spike added	qc spike measured	qc spike recovery
93-76-5	1.56	mg/L	TRG				
94-75-7	3.17	mg/L	TRG				
PHEN2F		mg/L	SUR		12.5	12.9	103

RESULT FILE FIELDS FOR A MATRIX SPIKE

The following table shows some of the fields in the result file for a matrix spike sample (i.e., Sample_type_code = MS). Note that all "dup" QC fields are blank, and that the result_value field is NULL. Also, the qc_rpd field would be blank for these rows. The parent_sample_code must contain the contents of the sys_sample_code of the original (parent) sample.

cas_rn	result value	qc original conc	qc spike added	qc spike measured	qc spike recovery	qc dup. original conc	qc dupl. Spike added	qc dup. spike measured	qc dup. spike recovery
93-76-5		1.56	4.18	5.36	90.9				
94-75-7		3.17	4.18	7.15	95.2				
94-82-6		2.31	4.22	5.66	79.3				

RESULT FILE FIELDS FOR A MATRIX SPIKE DUPLICATE

The following table shows some of the fields in the result file for a matrix spike/matrix spike duplicate considered as a single sample (i.e., Sample_type_code = MSD). Note that all QC fields are completed, and that the result_value field is not needed. Also, the qc_rpd field would be completed for these rows. The parent_sample_code must contain the contents of the sys_sample_code of the original (parent) sample.

cas_rn	result value	qc original conc	qc spike added	qc spike measured	qc spike recovery	qc dup original conc	qc dup. spike added	qc dup spike measured	qc dup spike recovery
93-76-5						1.56	4.23	5.70	97.8
94-75-7						3.17	4.23	7.62	105
94-82-6						2.31	4.13	5.33	73.1

RESULT FILE FIELDS FOR A LCS or BS \

The following table shows some of the fields in the result file for an LCS sample (i.e., laboratory control sample, blank spike, Sample_type_code = BS). The qc_rpd field is left blank for these rows.

cas_rn	result value	qc original conc	qc spike added	qc spike measured	qc spike recovery	qc dup original conc	qc dup spike added	qc dup spike measured	qc dup spike recovery
93-76-5		1.5	5.00	5.26	105				
94-75-7		10.2	1.00	1.02	102				
94-82-6		3.4	12.5	12.9	103				

RESULT FILE FIELDS FOR A LCS DUPLICATE OR BS DUPLICATE

The following table shows some of the fields in the result file for a laboratory control sample duplicate (i.e., Sample_type_code = BD). Note that the result_value field is not required. Also, the qc_rpd field must be completed for these rows.

cas_rn	result value	qc original conc	qc spike added	qc spike measured	qc spike recovery	qc dup original conc	qc dup spike added	qc dup spike measured	qc dup spike recovery	qc_rpd
93-76-5							5.00	4.92	98	2.0
94-75-7							1.00	0.95	95	6.6
94-82-6							12.5	11.8	94	12.3

REANALYSES, REEXTRACTIONS, DILUTIONS

The following table shows how to report retests for three different circumstances. The first example, the sample was retested (for 75-25-2) because the initial result required reanalysis due to QC failure. For the second example, the initial sample result (for 95-95-4) required dilution. The third example (for 67-66-3) required both reanalysis and dilution (reanalysis supercedes dilution). The fourth example (87-86-5) shows an initial result that require re-extraction due to QC failure or elevated concentrations that could not be diluted based on the original extraction. The other results are "turned off" by setting the reportable_result field to "No".

test_type	cas_rn	result_value	reportable_result
initial	75-25-2	1.2	No
reanalysis	75-25-2	1.1	Yes
initial	95-95-4	250E	No
dilution	95-95-4	328	Yes
initial	67-66-3	3.4	No
reanalysis	67-66-3	3.3	Yes
initial	87-86-5	980E	No
reextraction	87-86-5	1500	Yes

ANALYSES REQUIRING SECOND COLUMN CONFIRMATION

Analyte identification requiring confirmation by a second analytical technique is required by certain gas chromatography (GC) methods. A common technique used to confirm the identity of an analyte is to analyze the sample using a second GC column that is dissimilar from the GC column used for the first analysis. This confirmation technique is used routinely when analyzing samples for pesticides, herbicides, and certain volatile organic compounds (e.g., BTEX), and the two analyses often are performed simultaneously using an instrument equipped with dual GC columns connected to common injection port.

The method for reporting data from dual column GC analyses is not standard throughout the environmental laboratory industry. Arcadis recommends that laboratories use the method described in SW-846 Method 8000B, unless project-specific requirements or the method used for analysis dictate otherwise. The following table illustrates the proper format to be used to report first and second column results. The results for the first and third constituents (75-25-2 and 95-95-4) are being reported from column 1, and the result for the second constituent (67-66-3) is being reported from column 2. The other results are "turned off" by setting the reportable_result field to "No".

column_number	cas_rn	result_value	reportable_result
1C	75-25-2	6.2	Yes
1C	67-66-3	3.4	No
1C	95-95-4	5.6	Yes
2C	75-25-2	1.3	No
2C	67-66-3	33.7	Yes
2C	95-95-4	5.4	No

REFERENCE TABLES

A number of fields in each of the EDD files must be entered to correspond exactly with reference values standardized by Arcadis. These reference values will be updated from time to time. Each laboratory will be supplied a copy of the updated document. It is the laboratory's responsibility to submit EDDs using the most current reference tables as defined by a specific project.

The following table summarizes the EDD fields where standard reference values must be used:

EDD File	EDD Field	Reference Table
Sample	sample_type_code	rt_sample_type
	sample_matrix_code	rt_matrix
Test	lab_anl_method_name	rt_anl_mthd
	lab_matrix_code	rt_matrix
	prep_method	rt_std_prep_mthd
	subsample_amount_unit	rt_unit
	final_volume_unit	rt_unit
Result	lab_anl_method_name	rt_anl_mthd
	cas_rn	rt_analyte
	chemical_name	rt_analyte
	result_type_code	rt_result_type
	lab_qualifier	rt_qualifier
	result_unit	rt_unit
	detection_limit_unit	rt_unit
Batch	lab_anl_method_name	rt_anl_mthd

5   EDP

The EDP data checker assists the **LABORATORY** in checking EDD files to ensure that they are error-free prior to submission to Arcadis. All laboratories providing data to Arcadis **must use** the EDP program to verify that EDDs are without error. The EDP error reports for each file **must be** submitted with each EDD.

The use of the EDP helps to solve common data population problems including duplicate data, incorrectly populated fields, and incorrect methods, CAS #s, and other acceptable reference values. If an EDD is received by Arcadis containing errors it will be rejected until the EDD report is acceptable for import into the EQuIS database. Invoice payment will not be made until the EDD is acceptable.

The EDP is a desktop application that works in conjunction with a format file. The format file provides the EDP with Arcadis specifications. The most up to date version of the EDP and format file may be downloaded here: https://earthsoft.com/products/edp/edp-format-for-arcadis_us/

Appendix B

Field Forms

Control Number: _____TSM- Pending_____

TSM + project number plus date as follows: xxxxxxxx.xxxx.xxxxx - dd/mm/year

ARCADIS

TAILGATE HEALTH & SAFETY MEETING FORM

Project Name:	Project Location:

Date:	Time:	Conducted by:	Signature/Title:

Issues or concerns from previous day's activities:

Task anticipated to be performed today:

☐ Additional permits/checklists attached

USE TRACK! Evaluate the hazards (h) for the tasks being performed today and rank as Low (L), Medium (M) or High (H). Use relevant JSAs, FHSHB, permit or other work standard to communicate controls (c) to be used to eliminate or mitigate identified hazards.

☐ Gravity (i.e., ladder, trips)　(L M H)　　☐ Motion (i.e., traffic, machinery)　(L M H)　　☐ Mechanical (i.e., augers, motors)　(L M H)
h: _____　h: _____　h: _____
c: _____　c: _____　c: _____

☐ Electrical (i.e., utilities)　(L M H)　　☐ Pressure (i.e., gas cyl., wells)　(L M H)　　☐ Environment (i.e., heat, cold)　(L M H)
h: _____　h: _____　h: _____
c: _____　c: _____　c: _____

☐ Chemical (i.e., fuel, acid, paint)　(L M H)　　☐ Biological (i.e., ticks, poison ivy)　(L M H)　　☐ Radiation (i.e., alpha, sun, laser)　(L M H)
h: _____　h: _____　h: _____
c: _____　c: _____　c: _____

☐ Sound (i.e., machinery)　(L M H)　　☐ Personal (i.e. alone, night)　(L M H)　　☐ Driving (i.e. car, ATV, boat)　(L M H)
h: _____　h: _____　h: _____
c: _____　c: _____　c: _____

☐ Refer to the attached Hazard Analysis Sheet(s) or JSA

Comments:

Signature and Certification: I have read and understand the project specific HASP for this project.

SSE Employee*	Non-Life Threatening Injury or Illness Call WorkCare 1-888-449-7787		
	Printed Name/Signature/Company	**Sign In Time**	**Sign Out Time**

I will STOP the job any time anyone is concerned or uncertain about health & safety or if anyone identifies a hazard or additional mitigation not recorded in the site, project, job or task hazard assessment.

I will be alert to any changes in personnel, conditions at the work site or hazards not covered by the original hazard assessments.

If it is necessary to **STOP THE JOB,** I will perform **TRACK**; and then amend the hazard assessments or the HASP as needed.

I will not assist a subcontractor or other party with their work unless it is absolutely necessary and then only after I have done TRACK and I have thoroughly controlled the hazard.

All site staff should arrive fit for work. If not, they should report to the supervisor any restrictions or concerns.

In the event of an injury, employees will call **WorkCare at 1.888.449-7787** and then notify the field supervisor.

Utility strike, motor vehicle accident or 3rd party property damage - field supervisor will immediately notify the Project or Task Manager

*Short Service Employee (SSE) working for Arcadis <1 year.

![ARCADIS — Design & Consultancy for natural and built assets]

Client: Norfolk Southern

Boring Log

Boring: _____   Project/No: Norfolk Southern _____   Page _____ of _____

Site Location: East Palestine _____   Drilling Started _____   Drilling Completed _____

Total Depth Drilled: _____   Hole Diameter: _____   Type of Sample/ Coring Device: _____

Length and Diameter of Coring Device: _____   Sampling Interval: _____ feet

Land-Surface Elev.: _____ feet   ☐ Surveyed   ☐ Estimated   Datum: _____

Drilling Fluid Used: _____   Drilling Method: _____

Drilling Contractor: _____   Driller: _____   Helper: _____

Prepared By: _____   Hammer Weight _____

Sample/Core Depth From	To	Core Recovery (%)	PID	Sample	Description

East Palestine, Ohio Derailment
Surface Soil Inspection and Sampling Report

Client	Norfolk Southern Railway Company	Site	East Palestine, Ohio Derailment
Project	Residential, Commercial, and Agricultural Surface Soil Sampling	**Time and Date**	
Weather		**Field Crew**	

SOIL INSPECTION LOG

Inspection Area ID / Property ID / Parcel Number / GPS Coordinates				
Define the limits of the inspection area *(e.g., area bounded by Main St, 1st Ave, Park St, 2nd Ave; eastern half of field at Main and Jackson; in ROW)*				
Property type classification (choose one, add notes if necessary)	Residential		Agricultural	
	Commercial		Special Use (e.g., school, park, playground)	
Is an access agreement required for the inspection?	YES		NO	
Has an access agreement been executed, if required?	YES		NO	
Do you have copy of access agreement?	YES		NO	
Notes on access or follow-up items:				
Did you observe ash in the inspection area?	YES		NO	
Was ash observed in ROW or private property?	ROW		Private Property	
Describe ash or soot-like material (if observed):				

SOIL INSPECTION LOG (continued)

Describe the nature and extent of ash or soot-like material (*e.g., in one location at address, widespread, discrete pockets*):					
Describe type and location of other potential sources in the area (if any) (*e.g., fire pits, burn barrels, lawn equipment*):					
Was a photograph of the ash taken?		YES		NO	
Will a soil sample be collected from the inspection area?		YES		NO	
	If YES, continue on to soil sampling log				
Client	Norfolk Southern Railway Company		**Site**	East Palestine, Ohio Derailment	
Project	Residential, Commercial, and Agricultural Surface Soil Sampling		**Time and Date**		
Weather			**Field Crew**		

SOIL INSPECTION LOG

<< Include sketch, property owner interactions or any other pertinent details below, if necessary >>

SOIL SAMPLING LOG

Sample Category	No Ash Observed		Ash Observed		Owner-Requested		Field Duplicate	
Is an access agreement required?	YES				NO			
Has an access agreement been executed, if required?	YES				NO			
Do you have copy of access agreement?	YES				NO			

All sampling must be completed in accordance with Section 3 of the Residential, Commercial, and Agricultural Soil Sampling Work Plan.

If ash is observed, collect two samples: (1) sample surface ash material (including brush, leaves, etc. if ash is observed on these materials) and (2) underlying soil, up to 6".

If no ash is observed, clear the ground surface of brush, leaves, etc. and collect two samples: (1) soil from 0-1" and (2) soil from 1-6".

Sample GPS Location:	

Shallower sample					
Sample ID		**Sample Date**		**Sample Time**	
Describe soil conditions in the sample (*soil type, color, and moisture content*):					

Deeper sample					
Sample ID		**Sample Date**		**Sample Time**	
Describe soil conditions in the sample (*soil type, color, and moisture content*):					
Describe any potential impacts observed in samples (*staining, odors*):					
Record PID reading for each sample interval:					
Sample labels (*check when complete*):		**Chain-of-custody** (*check when complete*):			

SOIL SAMPLING LOG (Continued)

Photographs of soil samples and borehole taken?		YES		NO	

Provide photograph ID(s) and descriptions below. Include view of a dry-erase board marked with the sample ID, date, and time and a view of a tape measure/ruler for scale in the photograph.

Sampling Notes and supplemental information
 << Include sketch, property owner interactions or any other pertinent details below, if necessary >>

Was the boring filled and returned to pre-sampling condition?		YES		NO	

Air Monitoring Documentation Form

ARCADIS

PID Model: _____

LEL/O$_2$ Model: _____

CHIP Model: _____

Dust Mon. Model: _____

Monitor Frequency: _____

Air Monitoring Results

Date	Time	PID (ppm)	Dusts (mg/m^3)	Phosgene (ppm)	Vinyl Chloride (ppm)	Dusts (mg/m^3)	Location

CIT = Colorimetric Indicator Tube
LEL = Lower Explosive Limit
mg/m3 = Milligram per cubic meter
O2 = Oxygen

ppm = Part per million
% = Percent
PID = Photoionization Detector

Data Element.	Data Collection Method SOPs (established or anticipated)	Data Verification Procedure SOPs (established or anticipated)	Other data management procedures (established or anticipated)	Roles and responsibilities	End-products and turnaround time the info will be available to the end user
[refer to NSR Data Inventory for each data element]	[State the method of data capture, like electronic form in FieldNow. If there is a field data collection procedure, written or anticipated, refer to it here]	[You will probably have field staff taking basic steps to ensure initial accuracy of information: location data, date/time, etc. Refer to all written procedures that will ensure data accuracy]	[Your data will be moved, formatted uploaded through the course of data flow. Refer to written procedures data managers have, or will need to ensure accuracy of information)]		[What are the end-products you will or may create based on need: • summaries uploaded to the "NS East Palestine Data Portal" • Data services available to internal reviewers • Data services available to external users (for instance, data made available pending development of the EPA Region 5 EQuIS Data via EQuIS to R5 EPA
Arcadis - See Table 1 below	Standard Operating Procedures are provided in Appendix A and Field forms are provided in in Appendix B	This step can be found in the overall DMP and the Arcadis EQuIS Load Data SOP.	This step can be found in the overall DMP and the Arcadis EQuIS Load Data SOP in Appendix A.	Arcadis - See Table 1 below.	End products include laboratory analytical reports, tables that summarize the data, and reports or results letters as detailed in the supporting work plans within the Removal Work Plan.

Table 1: Arcadis Data Management Team Personnel Roles and Responsibilities

Name	Roles/Responsibilities	Split Samples Collected (Y/N) and Agency	Telephone Number	E-mail address
Dennis Capria	Overall Data Management and QAPP Manager	NA	315-671-9299	Dennis.Capria@arcadis.com
Keith Peterson	GIS Management	NA	570-538-2764	Keith.Peterson@arcadis.com
Pat Foos	Database Manager	NA	315-671-9194	Patrick.Foos@arcadis.com
Jeff Bonsteel	Manager of Main Line Interim Soil Removal	Yes – USEPA	518-727-9707	Jeffrey.Bonsteel@arcadis.com
Jeff Bonsteel	Manager of Characterization for Derailment-Area Soil	TBD	518-727-9707	Jeffrey.Bonsteel@arcadis.com
Scott Powlin	Manager of Phase I - Preliminary Residential / Commercial / Agricultural Soil Sampling	Yes - USEPA	315-671-9456	Scott.Powlin@arcadis.com
Michael Potter	Manager of Groundwater Characterization	No	317-292-0683	Michael.Potter@arcadis.com
Michelle Clayton	Manager of Waste Sampling	No	412-614-1624	Michelle.Clayton@arcadis.com
Heather VanDewalker	Manager of Sediment Sampling	No	315-671-9382	Heather.VanDewalker@arcadis.com
Carolyn Grogan	Manager of Plaintiff Split Samples	Yes – Plaintiffs	614-271-6586	Carolyn.grogan@arcadis.com

ATTACHMENT 2

CTEH

East Palestine Train Derailment Site

Data Management Plan

Data Stream Summary

CTEH Data Management
Data Flow Summary Tables

1.　　In Home Hand-held Air Monitoring

2.　　Roaming Hand-held Air Monitoring

3.　　Stationary Air Monitoring

4.　　Air Sampling

5.　　Photos

6.　　Surface Water Sampling

7.　　Surface Wipe Sampling

8.　　Data Flow Summary Diagram

Table 1 – CTEH Contacts – Roles & Responsibilities

Table 2 – CTEH Relevant Documents

Data Element	Data Collection Method SOPs	Data Verification Procedure SOPs	Other data Management Procedures	Roles and Responsibilities	End-products & turnaround time info will be available to the end user
CTEH In-Home Hand-Held Air Monitoring Data and Locations	The concentration of an analyte from the sampling instrument is observed by field personnel.

The observed concentration and additional metadata including, but not limited to, time, location, odor, weather conditions, and possible sources of interference are entered into a CTEH mobile application.

Readings are recorded on a paper form which includes: time, location, measured compound, result, comments, sampler name, property address, and resident name. A photo of the form is taken using a CTEH mobile data application and submitted to the CTEH database. The form is then provided to the resident. | Field personnel check their entries for consistency and accuracy before submitting records to the CTEH database.

Additional CTEH QAQC personnel review records for consistency and accuracy after they are submitted to the database. When necessary, field personnel are contacted to answer questions regarding their submitted records.

Amendments to records are tracked in a change log and/or QAQC comments. | Data is loaded from the mobile data collection application into the CTEH project database for reporting and long-term retention. | The air sampling/monitoring data manager will oversee report production and data analysis. The data manager will assist QAQC and field personnel with any quality and consistency issues outside of their area of expertise. | Air monitoring records will be submitted to the CTEH database at a minimum of once per shift.

Reports are not currently produced from this dataset.

The paper form of observed readings is provided to the resident when monitoring is completed.

Air monitoring data is available on the CTEH project website. |

Data Element	Data Collection Method SOPs	Data Verification Procedure SOPs	Other data Management Procedures	Roles and Responsibilities	End-products & turnaround time info will be available to the end user
CTEH Roaming Hand-Held Air Monitoring Data and Locations	The concentration of an analyte from the sampling instrument is observed by field personnel. The observed concentration and additional metadata including, but not limited to, time, location, odor, weather conditions, and possible sources of interference are entered into a CTEH mobile application.	Field personnel check their entries for consistency and accuracy before submitting records to the CTEH database. Additional CTEH QAQC personnel review records for consistency and accuracy after they are submitted to the database. When necessary, field personnel are contacted to answer questions regarding their submitted records. Amendments to records are tracked in a change log and/or QAQC comments.	Data is loaded from the mobile data collection application into the CTEH project database for reporting and long-term retention.	The air sampling/monitoring data manager will oversee report production and data analysis. The data manager will assist QAQC and field personnel with any quality and consistency issues outside of their area of expertise.	Air monitoring records will be submitted to the CTEH database at a minimum of once per shift. Daily air monitoring summaries will be generated covering the previous day's shift. They will be uploaded to the NS SharePoint when internal review is complete. Air monitoring data is available on the CTEH project website.

Data Element	Data Collection Method SOPs	Data Verification Procedure SOPs	Other Data Management Procedures	Roles and Responsibilities	End-products & turnaround time info will be available to the end user
CTEH Stationary Air Monitoring Data and Locations.	Stationary air monitoring instruments broadcast their data to an on-site computer hosting Honeywell Safety-Suite unless otherwise specified in the *"Other data management procedures"* column.

A minimum of once per day data is exported from the Safety-Suite database and imported into the CTEH project database using proprietary CTEH software. | CTEH personnel observe stationary monitoring data as it is received by Safety-Suite.

When necessary, personnel are directed to investigate elevated or unusual readings, repair malfunctioning equipment, and calibrate equipment.

When notable events occur, field personnel log notes pertaining to the event in a mobile application for submission to the database. | When stationary instruments are data-logged instead of connected to Safety-Suite, the data logs will be recovered from the instrument and stored in the project folder on a CTEH file server.

Dräger X-PID instrument records are recovered each shift and loaded into the CTEH project database using proprietary CTEH software. | The air sampling/monitoring data manager will oversee report production and data analysis. The data manager will assist QAQC and field personnel with any quality and consistency issues outside of their area of expertise. | Air monitoring records will be imported to the CTEH database at a minimum of once per day.

Daily air monitoring summaries will be generated covering the previous day's shifts. They will be uploaded to the NS SharePoint when internal review is complete. |

Data Element	Data Collection Method SOPs	Data Verification Procedure SOPs	Other Data Management Procedures	Roles and Responsibilities	End-products & turnaround time info will be available to the end user
CTEH Air Sampling Data and Locations.	Meta data including, but not limited to, time, location, odor, weather conditions, and notes regarding possible sources of interference are entered into a CTEH mobile application. Paper Chain of Custodies (COCs) are prepared for inclusion with the sample shipment. The document is submitted along with the samples for delivery to the contracted lab. A photo of the COC is taken using a CTEH mobile application and submitted to the CTEH database.	Field personnel check their entries for consistency and accuracy before submitting records to the CTEH database. Additional CTEH QAQC personnel review records for consistency and accuracy after they are submitted to the database. When necessary, field personnel are contacted to answer questions regarding their submitted records. Amendments to records are tracked in a change log and/or QAQC comments.	Copies of the lab reports and Electronic Data Deliverables (EDDs) are submitted to both CTEH and the contracted validation company (on this project Environmental Standards) from the contracted lab. Environmental Standards performs Level 2 and/or Level 4 validation on the sample results as outlined in the approved air sampling and analysis plan. Environmental Standards then submits the validated EDD and their report to CTEH.	The air sampling/monitoring data manager will oversee report production and data analysis. The data manager will assist QAQC and field personnel with any quality and consistency issues outside of their area of expertise. The data manager will coordinate with CTEH field personnel, CTEH project managers, CTEH toxicologists, the contracted lab, and the Environmental Standards project manager.	Air sample records will be imported to the CTEH database at a minimum of once per day. Lab results will be received from the lab based on the turnaround time established in the approved air sampling and analysis plan. Lab result EDDs will be imported to the CTEH database on the day of receipt from the lab or Environmental Standards. Updated air sampling summary tables are produced upon receipt of new lab results. They will be uploaded to the NS SharePoint when internal review is complete. Laboratory reports will be uploaded to the NS SharePoint upon receipt. Air sampling results and field data are available on the CTEH project website.

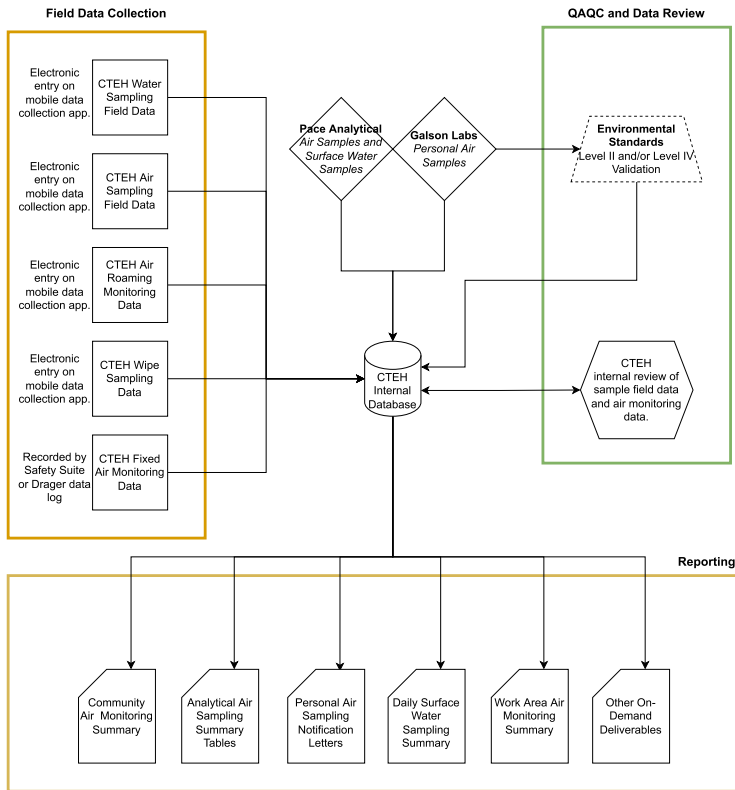| Data Element	Data Collection Method SOPs	Data Verification Procedure SOPs	Other Data Management Procedures	Roles and Responsibilities	End-products & turnaround time info will be available to the end user
CTEH Photos	Photos are collected using a CTEH mobile data collection application. Photos can be generated for sampling events, safety observation, air monitoring observations, or any other project task where they may add value.	Field personnel check their entries for consistency and accuracy before submitting records to the CTEH database. Additional CTEH QAQC personnel review records for consistency and accuracy after they are submitted to the database. When necessary, field personnel are contacted to answer questions regarding their submitted records. Amendments to records are tracked in a change log and/or QAQC comments.	Data is loaded from the mobile data collection application into the CTEH project database for reporting and long-term retention.	The air sampling/monitoring data manager or environmental data manager will oversee report production and data analysis. The data manager will assist QAQC and field personnel with any quality and consistency issues outside of their area of expertise.	Photos along with the respective database records will be submitted to the CTEH database at a minimum of once per shift. Photos are not currently included in reports. Photos are available on the CTEH project website.

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Data Element	Data Collection Method SOPs	Data Verification Procedure SOPs	Other Data Management Procedures	Roles and Responsibilities	End-products & turnaround time info will be available to the end user
CTEH Surface Water Data and Locations.	Meta data including, but not limited to, time, location, odor, weather conditions, and notes regarding possible sources of interference are entered into a CTEH mobile application. Instantaneous water quality measurements of turbidity, temp, salinity, DO, pH, ORP and TDS are entered for the associated sample. Paper Chain of Custodies (COCs) are prepared for inclusion with the sample shipment. The document is submitted along with the samples for delivery to the contracted lab. A photo of the COC is taken using a CTEH mobile application and submitted to the CTEH database.	Field personnel check their entries for consistency and accuracy before submitting records to the CTEH database. Additional CTEH QAQC personnel review records for consistency and accuracy after they are submitted to the database. When necessary, field personnel are contacted to answer questions regarding their submitted records. Amendments to records are tracked in a change log and/or QAQC comments.	Copies of the lab reports and Electronic Data Deliverables (EDDs) are submitted to both CTEH and the contracted validation company (on this project Environmental Standards) from the contracted lab. Environmental Standards performs level 2 and/or level 4 validation on the sample results as outlined in the approved surface water sampling and analysis plan. Environmental Standards then submits the validated EDD and their report to CTEH.	The environmental sampling data manager will oversee report production and data analysis. The data manager will assist QAQC and field personnel with any quality and consistency issues outside of their area of expertise. The data manager will coordinate with CTEH field personnel, CTEH project managers, CTEH toxicologists, the contracted lab, and the Environmental Standards project manager.	Surface water sample records will be imported to the CTEH database at a minimum of once per day. Lab results will be received from the lab based on the turnaround time established in the approved surface water sampling and analysis plan. Lab result EDDs will be imported to the CTEH database on the day of receipt from the lab or Environmental Standards. Updated surface water sampling summary tables are produced upon receipt of new lab results. They will be uploaded to the NS SharePoint when internal review is complete. Laboratory reports will be uploaded to the NS SharePoint upon receipt. Surface water sampling results and field data are available on the CTEH project website.

Data Element	Data Collection Method SOPs	Data Verification Procedure SOPs	Other Data Management Procedures	Roles and Responsibilities	End-products & turnaround time info will be available to the end user
CTEH Surface Wipe Sampling Data.	Meta data including, but not limited to, time, location, odor, weather conditions, and notes regarding possible sources of interference are entered into a CTEH mobile application. Paper Chain of Custodies (COCs) are prepared for inclusion with the sample shipment. The document is submitted along with the samples for delivery to the contracted lab. A photo of the COC is taken using a CTEH mobile application and submitted to the CTEH database.	Field personnel check their entries for consistency and accuracy before submitting records to the CTEH database. Additional CTEH QAQC personnel review records for consistency and accuracy after they are submitted to the database. When necessary, field personnel are contacted to answer questions regarding their submitted records. Amendments to records are tracked in a change log and/or QAQC comments.	Copies of the lab reports and Electronic Data Deliverables (EDDs) are submitted to both CTEH and the contracted validation company (on this project Environmental Standards) from the contracted lab. Environmental Standards performs Level 2 and/or Level 4 validation on the sample results as outlined in the approved wipe sampling and analysis plan. Environmental Standards then submits the validated EDD and their report to CTEH.	The environmental sampling data manager will oversee report production and data analysis. The data manager will assist QAQC and field personnel with any quality and consistency issues outside of their area of expertise. The data manager will coordinate with CTEH field personnel, CTEH project managers, CTEH toxicologists, the contracted lab, and the Environmental Standards project manager.	Surface wipe sample records will be imported to the CTEH database at a minimum of once per day. Lab results will be received from the lab based on the turnaround time established in the approved wipe sampling and analysis plan. Lab result EDDs will be imported to the CTEH database on the day of receipt from the lab or Environmental Standards. No reports for wipe sampling are being produced at this time. Wipe sampling results and field data are available on the CTEH project website.

CTEH Data Flow
Summary

Field Data Collection

QAQC and Data Review

Electronic entry on mobile data collection app.
CTEH Water Sampling Field Data

Electronic entry on mobile data collection app.
CTEH Air Sampling Field Data

Electronic entry on mobile data collection app.
CTEH Air Roaming Monitoring Data

Electronic entry on mobile data collection app.
CTEH Wipe Sampling Data

Recorded by Safety Suite or Drager data log
CTEH Fixed Air Monitoring Data

Pace Analytical
Air Samples and Surface Water Samples

Galson Labs
Personal Air Samples

Environmental Standards
Level II and/or Level IV Validation

CTEH Internal Database

CTEH internal review of sample field data and air monitoring data.

Reporting

Community Air Monitoring Summary

Analytical Air Sampling Summary Tables

Personal Air Sampling Notification Letters

Daily Surface Water Sampling Summary

Work Area Air Monitoring Summary

Other On-Demand Deliverables

Table 1: CTEH Contacts

Name	Roles/Responsibilities	Phone	E-Mail
Daniel White	Director Data Management	501-240-8422	dwhite@cteh.com
Eric Callahan	IT Project Manager	501-366-1525	ecallahan@cteh.com
Luke Blansett	Environmental Data Manger. Surface water sampling and wipe sampling	501-503-9734	lblansett@cteh.com
Devin Cornwell	Air Sampling/Monitoring data manager. Roaming air monitoring, fixed air monitoring, in-home air monitoring, and air sampling.	501-271-6713	dcornwell@cteh.com

Table 2: CTEH Relevant Documents

Document	Description
CTEH Quality Manual QMP100	Describes the Quality Management System (QMS) used at CTEH following ISO 9001:2008.
Air Sampling and Analysis Plan	Describes air monitoring and sampling methodologies and procedures.
Environmental Sampling and Analysis Plan	Describes surface water sampling methodologies and procedures.
Forensic Wipe Sampling and Analysis Plan	Describes wipe sampling methodologies and procedures.
Sampling Data and Documentation SOP	Outlines procedures and appropriate applications for data and documentation of sampling.
Honeywell Safety Suite SOP	Procedures for the use of Honeywell Safety Suite.
Safety Suite Backup Utility SOP	Procedures for backup of data from Honeywell Safety Suite.
Environmental Standards Level 2 and Level 4 Validation SOPs	Describes Environmental Standards policies and procedures for Level 2 and Level 4 environmental data validation.

ATTACHMENT 3

STANTEC
East Palestine Train Derailment Site

Data Management Plan

Data Stream Summary

Please refer to attached Process Flow Diagrams for current (Figure 1) and conceptual (Figure 2) data flow from field to the NS Sharepoint site. Norfolk Southern is developing a centralized database to house analytical data and Stantec is working to integrate a database application to simplify collection and management of field data.

Data Element.	Data Collection Method SOPs (established or anticipated)	Data Verification Procedure SOPs (established or anticipated)	Other Data Management Procedures (established or anticipated)	Roles and Responsibilities	End-products &turnaround time info will be available to the end user
Potable Well Sample Location Field Data. Includes water quality parameters, purge records, field notes, and GIS data.	Field Collection SOPs provided in Potable Water Sampling Work Plan Update (March 5, 2023) Appendix A. Data hand recorded from field instruments, geospatial data collected electronically. Working to capture all field parameters electronically in database app.	Field team checks data for consistency during collection with third party review. Field leader reviews data daily at IC. Stantec Quality Management Plan provides additional detail for verification protocols.	Automated GIS data collection in development to provide sample location verification and electronic storage of field parameters. Currently, field data is recorded on hard copy and scanned for upload to NS Sharepoint.	Field team - collect data at individual sampling locations and share/verify with third party agency team. Field leader provides daily QA of data before upload. Main Point of Contact: Tom Cole, Stantec Thomas.Cole@Stantec.com 517-712-7969	Scanned field forms uploaded daily to NS Sharepoint. GIS viewer or shapefile available on request with updated sample locations. Geospatial data may be emailed to requested recipient. Currently developing database application to acquire electronic data for requested reporting.
Potable Well Sample Analytical Data. Includes preliminary and validated analytical data for potable water samples from private wells.	Refer to Eurofins' SOPs for data generation. Preliminary data pkg and EDD transferred to Stantec via email. Stantec imports EDD to EQuIS and generates	Refer to Environmental Standards' SOPs for data validation. Transfer flatfile to ESI via email. ESI returns flatfile with data qualifiers to Stantec via email.	Validated data package reviewed by Stantec against comparison values for list of analytes and categorized as Non-detect or Detection groups for communication. Stantec communicates	Brigid Zvirbulis, Stantec Brigid.zvirbulis @stantec.com 248-522-8304 for fixed laboratory data Carole Lieu, Stantec Carole.Lieu@stantec.com 226-929-7875 for EQuIS database information	Laboratory data pkgs posted to NS Sharepoint, referenced to well identification number. Turn around time from date of sampling to date of validation is approximately 7 -10 days.

Please refer to attached Process Flow Diagrams for current (Figure 1) and conceptual (Figure 2) data flow from field to the NS Sharepoint site. Norfolk Southern is developing a centralized database to house analytical data and Stantec is working to integrate a database application to simplify collection and management of field data.

	flatfile for validation.\n\nPreliminary data pkg uploaded to NS Sharepoint.	ESI uploads validated data report to NS Sharepoint and requests Eurofins to send final data package.\n\nStantec uploads final data pkg to NS Sharepoint.	validated and reviewed results to property owners via phone, email, and/or hard copy mailing.		Verbal notification to residents attempted following receipt of validated data with mailed hard copy to follow.
Public Water Supply Well Field Data.\n\nIncludes water quality parameters, purge records, field notes, and GIS data.	Field Collection SOPs provided in Potable Water Sampling Work Plan Update (March 5, 2023) Appendix A.\n\nData hand recorded from field instruments, geospatial data collected electronically.\n\nWorking to capture all field parameters electronically in database app.	Field team checks data for consistency during collection with third party review. Field leader reviews data daily at IC.\n\nStantec Quality Management Plan provides additional detail for verification protocols.	Automated GIS data collection in development to provide sample location verification and electronic storage of field parameters.\n\nCurrently, field data is recorded on hard copy and scanned for upload to NS Sharepoint.	Field team - collect data at individual sampling locations and share/verify with third party agency team.\n\nField leader provides daily QA of data before upload.\n\nMain Point of Contact:\nTom Cole, Stantec\nThomas.Cole@Stantec.com\n517-712-7969	Scanned field forms uploaded daily to NS Sharepoint.\n\nGIS viewer or shapefile available with sample locations. Geospatial data may be emailed to requested recipient.\n\nCurrently developing database application to acquire electronic data for requested reporting.
Public Water Supply Well Sample Analytical Data.\n\nIncludes preliminary and validated analytical data for potable water samples	Refer to Eurofins' SOPs for data generation.\n\nPreliminary data pkg and EDD transferred to Stantec via email.	Refer to Environmental Standards' SOPs for data validation.\n\nTransfer flatfile to ESI via email. ESI returns flatfile with data qualifiers to	Validated data package reviewed by Stantec against comparison values for list of analytes.\n\nCommunication to well operator provided through third	Brigid Zvirbulis, Stantec\nBrigid.zvirbulis@stantec.com\n248-522-8304 for fixed laboratory data\n\nCarole Lieu, Stantec\nCarole.Lieu@stantec.com\n226-929-7875	Laboratory data pkgs posted to NS Sharepoint, referenced to well identification number.\n\nTurn around time from date of sampling to date of

Please refer to attached Process Flow Diagrams for current (Figure 1) and conceptual (Figure 2) data flow from field to the NS Sharepoint site. Norfolk Southern is developing a centralized database to house analytical data and Stantec is working to integrate a database application to simplify collection and management of field data.
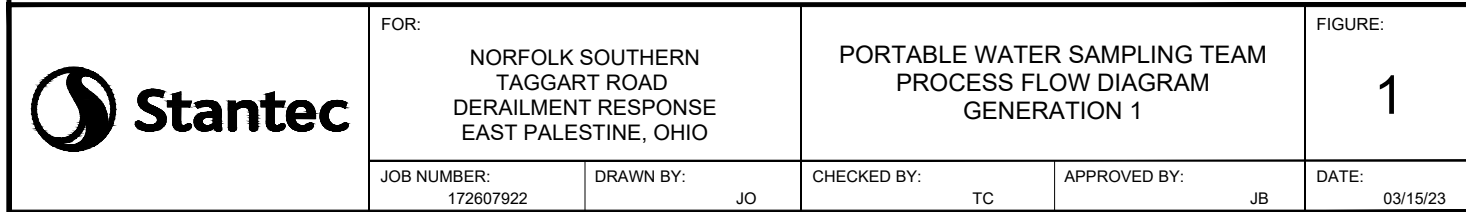
from private wells.	Stantec imports EDD to EQuIS and generates flatfile for validation. Preliminary data pkg uploaded to NS Sharepoint.	Stantec via email. ESI uploads validated data report to NS Sharepoint and requests Eurofins to send final data package. Stantec uploads final data pkg to NS Sharepoint.	party agency with split sample results.	for EQuiS database information	validation is approximately 7 -10 days.
Sentinel Well Field Data. Includes water quality parameters, purge records, field notes, and GIS data.	Field Collection SOPs provided in Potable Water Sampling Work Plan Update (March 5, 2023) Appendix A. Data hand recorded from field instruments, geospatial data collected electronically. Working to capture all field parameters electronically in database app.	Field team checks data for consistency during collection with third party review. Field leader reviews data daily at IC. Stantec Quality Management Plan provides additional detail for verification protocols.	Automated GIS data collection in development to provide sample location verification and electronic storage of field parameters. Currently, field data is recorded on hard copy and scanned for upload to NS Sharepoint.	Field team - collect data at individual sampling locations and share/verify with third party agency team. Field leader provides daily QA of data before upload. Main Point of Contact: Michael Hutchinson, Stantec Michael.Hutchinson@Stantec.com 770-846-8716	Scanned field forms uploaded daily to NS Sharepoint. GIS viewer or shapefile available on request with updated sample locations. Geospatial data may be emailed to requested recipient. Currently developing database application to acquire electronic data for requested reporting.
Sentinel Well Sample Analytical Data. Includes preliminary and validated analytical data	Refer to Eurofins' SOPs for data generation. Preliminary data pkg and EDD	Refer to Environmental Standards' SOPs for data validation. Transfer flatfile to ESI via	Validated data package reviewed by Stantec against comparison values for list of analytes.	Brigid Zvirbulis, Stantec Brigid.zvirbulis @stantec.com 248-522-8304 for fixed laboratory data Carole Lieu,	Laboratory data pkgs posted to NS Sharepoint, referenced to well identification number.

Please refer to attached Process Flow Diagrams for current (Figure 1) and conceptual (Figure 2) data flow from field to the NS Sharepoint site. Norfolk Southern is developing a centralized database to house analytical data and Stantec is working to integrate a database application to simplify collection and management of field data.
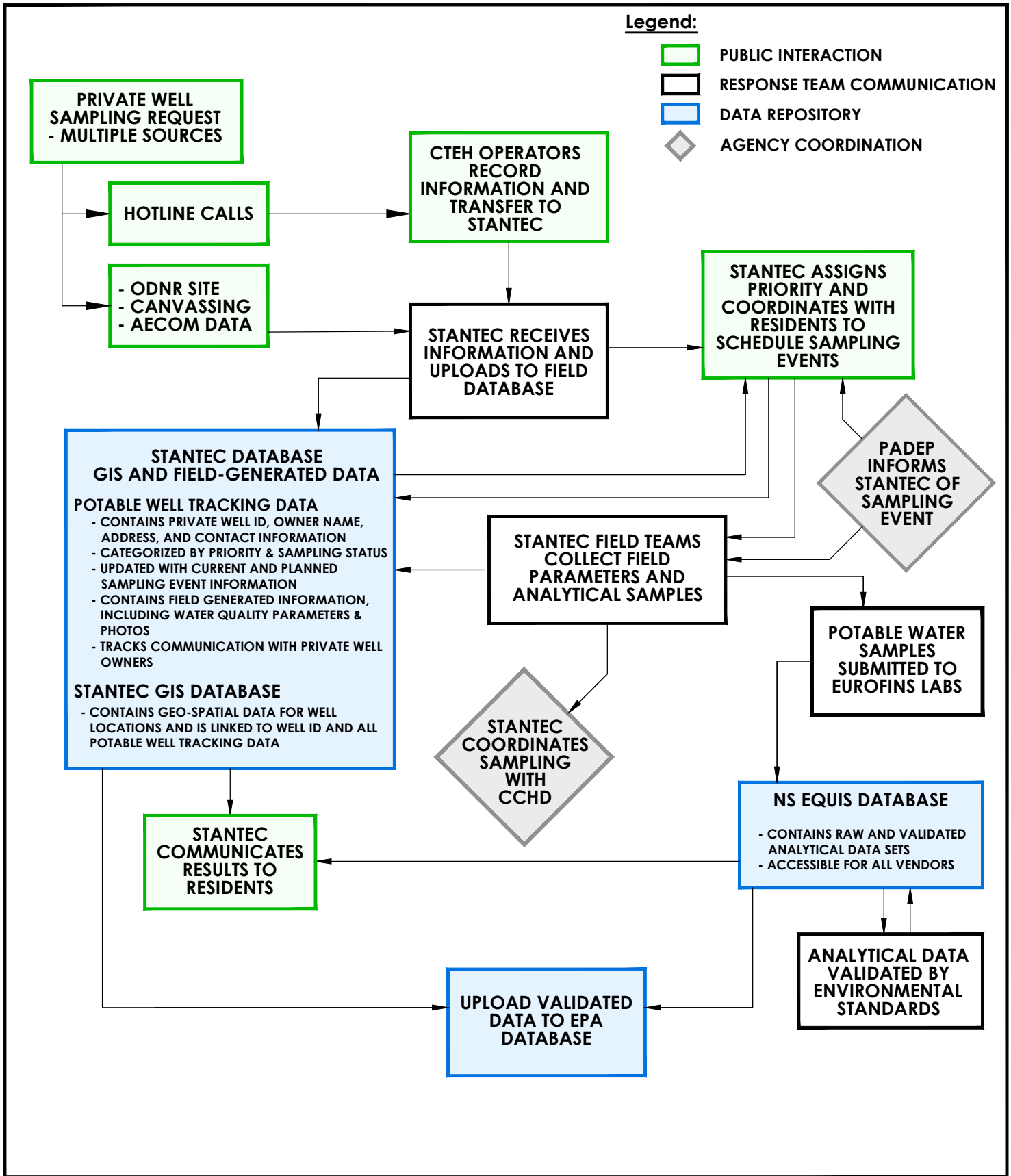
for potable water samples from private wells.	transferred to Stantec via email. Stantec imports EDD to EQuIS and generates flatfile for validation. Preliminary data pkg uploaded to NS Sharepoint.	email. ESI returns flatfile with data qualifiers to Stantec via email. ESI uploads validated data report to NS Sharepoint and requests Eurofins to send final data package. Stantec uploads final data pkg to NS Sharepoint.		Stantec Carole.Lieu@stantec.com 226-929-7875 for EQuiS database information	Turn around time from date of sampling to date of validation is approximately 7-10 days.
Site Photos	Site photos taken during initial sampling and survey collection to provide visual documentation of site conditions.	Staff verifies correct and appropriate images are referenced for the applicable well ID. Photos are uploaded to the NS Sharepoint along with field data forms. Working to develop database application that would allow photo uploads directly to database for requested reporting.	No additional data management procedures conducted.	Field team - collect appropriate images from sampling locations, as necessary. Main Point of Contact: Tom Cole, Stantec Thomas.Cole@Stantec.com 517-712-7969	Images transferred daily and available on NS Sharepoint immediately upon upload.

Legend:
- PUBLIC INTERACTION
- RESPONSE TEAM COMMUNICATION
- DATA REPOSITORY
- AGENCY COORDINATION

PRIVATE WELL SAMPLING REQUEST - MULTIPLE SOURCES

HOTLINE CALLS

- ODNR SITE
- CANVASSING
- AECOM DATA

CTEH OPERATORS RECORD INFORMATION AND TRANSFER TO STANTEC

STANTEC RECEIVES INFORMATION AND DETERMINES SAMPLING PRIORITY

STANTEC COORDINATES WITH RESIDENTS TO SCHEDULE SAMPLING EVENTS

PADEP INFORMS STANTEC OF SAMPLING EVENT

SHAREPOINT SITE: HOUSES ALL FIELD-GENERATED AND ANALYTICAL DATA

POTABLE WELL TRACKING SHEET
- CONTAINS PRIVATE WELL OWNER NAME, ADDRESS, AND CONTACT INFORMATION
- CATEGORIZED BY PRIORITY
- UPDATED WITH CURRENT AND PLANNED SAMPLING EVENT INFORMATION

ANALYTICAL RESULTS TRACKING SHEETS
- CONTAINS FIELD GENERATED INFORMATION, INCLUDING WATER QUALITY PARAMETERS AND PHOTOS
- CONTAINS VALIDATED ANALYTICAL DATA
- TRACKS COMMUNICATION WITH PRIVATE WELL OWNERS

STANTEC FIELD TEAMS COLLECT FIELD PARAMETERS AND ANALYTICAL SAMPLES

POTABLE WATER SAMPLES SUBMITTED TO EUROFINS LABS

STANTEC COORDINATES SAMPLING WITH CCHD

PRELIMINARY ANALYTICAL RESULTS TRANSMITTED TO STANTEC

STANTEC COMMUNICATES RESULTS TO RESIDENTS

STANTEC GIS DATABASE
- CONTAINS GEO-SPATIAL DATA FOR WELL LOCATIONS AND LINKS TO VALIDATED ANALYTICAL DATA, FIELD PARAMETERS, PHOTOS, ETC.

VALIDATED ANALYTICAL RESULTS TRANSMITTED TO STANTEC

ANALYTICAL DATA FLAT FILE SENT TO ESI FOR VALIDAITON

FINAL DATA PACKAGE REQUESTED FROM EUROFINS

EQUIS DATABASE
- CONTAINS PRELIMINARY AND VALIDATED ANALYTICAL DATA

UPLOAD FINAL DATA PACKAGE TO NS SHAREPOINT

	FOR:		FIGURE:
Stantec	NORFOLK SOUTHERN TAGGART ROAD DERAILMENT RESPONSE EAST PALESTINE, OHIO	PORTABLE WATER SAMPLING TEAM PROCESS FLOW DIAGRAM GENERATION 1	**1**
	JOB NUMBER: 172607922	DRAWN BY: JO	CHECKED BY: TC	APPROVED BY: JB	DATE: 03/15/23

Legend:
- PUBLIC INTERACTION (green box)
- RESPONSE TEAM COMMUNICATION (black box)
- DATA REPOSITORY (blue box)
- AGENCY COORDINATION (gray diamond)

PRIVATE WELL SAMPLING REQUEST - MULTIPLE SOURCES

HOTLINE CALLS

- ODNR SITE
- CANVASSING
- AECOM DATA

CTEH OPERATORS RECORD INFORMATION AND TRANSFER TO STANTEC

STANTEC RECEIVES INFORMATION AND UPLOADS TO FIELD DATABASE

STANTEC ASSIGNS PRIORITY AND COORDINATES WITH RESIDENTS TO SCHEDULE SAMPLING EVENTS

PADEP INFORMS STANTEC OF SAMPLING EVENT

STANTEC DATABASE GIS AND FIELD-GENERATED DATA

POTABLE WELL TRACKING DATA
- CONTAINS PRIVATE WELL ID, OWNER NAME, ADDRESS, AND CONTACT INFORMATION
- CATEGORIZED BY PRIORITY & SAMPLING STATUS
- UPDATED WITH CURRENT AND PLANNED SAMPLING EVENT INFORMATION
- CONTAINS FIELD GENERATED INFORMATION, INCLUDING WATER QUALITY PARAMETERS & PHOTOS
- TRACKS COMMUNICATION WITH PRIVATE WELL OWNERS

STANTEC GIS DATABASE
- CONTAINS GEO-SPATIAL DATA FOR WELL LOCATIONS AND IS LINKED TO WELL ID AND ALL POTABLE WELL TRACKING DATA

STANTEC FIELD TEAMS COLLECT FIELD PARAMETERS AND ANALYTICAL SAMPLES

POTABLE WATER SAMPLES SUBMITTED TO EUROFINS LABS

STANTEC COORDINATES SAMPLING WITH CCHD

NS EQUIS DATABASE
- CONTAINS RAW AND VALIDATED ANALYTICAL DATA SETS
- ACCESSIBLE FOR ALL VENDORS

STANTEC COMMUNICATES RESULTS TO RESIDENTS

ANALYTICAL DATA VALIDATED BY ENVIRONMENTAL STANDARDS

UPLOAD VALIDATED DATA TO EPA DATABASE

End of Document

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